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Ministry of
Energy, Mines and
Petroleum Resources

MINERAL RESOURCES DIVISION

1983

SUMMARY OF OPERATIONS

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VICTORIA
BRITISH COLUMBIA
CANADA

JULY 1985

FOREWORD

The *Summary of Operations, 1983, Mineral Resources Division* provides a review of the mineral industry, detailed statistics of its performance, and a summary of the activities of the Mineral Resources Division. These three elements--review, statistics, and operations of the Division--form three chapters that follow the format of the equivalent chapters in the *Annual Report of the Minister* in 1979. The creation of a volume, *Summary of Operations*, parallels the practice in the Petroleum Resources Division and it is intended to eventually get the data of the industry to the interested public in a more timely manner while leaving the *Annual Report of the Minister* free of details and statistics.

The evolution of Ministry yearly reports continues as the mineral and fuel resources industry grows and diversifies. *Annual Reports of the Minister of Mines* have been published since 1874. Changes in name of the Ministry occurred in 1959, to Mines and Petroleum Resources, and in 1978, to Energy, Mines and Petroleum Resources. In addition, beginning in 1969 geological and technical reports previously published as part of the Annual Report were published as a separate volume entitled *Geology, Exploration and Mining in British Columbia*. Starting in 1975, this technical volume was divided into separate reports and were to be issued as prepared. Detailed information on mine safety, fatal accidents, dangerous occurrences, etc., was included in the Annual Report until 1973, for 1974 this information was issued separately and subsequently forms part of the separate volume *Mining in British Columbia*.

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THE MINERAL INDUSTRY IN 1983

CHAPTER 1

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SUMMARY OF OPERATIONS

REVIEW

The minerals sector in British Columbia showed a moderate improvement in 1983 over 1982 but growth was hampered by a lack of strong demand.

The total value of mineral production (including solid minerals, petroleum, and natural gas) was $2 857.1 million, up $60.0 million or 2.1 per cent, from $2 797.1 million in 1982. In terms of constant 1978 dollars, however, the 1983 value was slightly lower than 1982 and the lowest since 1978 (Fig. 1-1).

Solid mineral production in British Columbia totalled $1 957.7 million in 1983, representing an increase of 3.9 per cent over $1 884.2 million in 1982.

Most of the solid minerals showed an increase in the value of production during 1983, with the notable exceptions of coal, molybdenum, and asbestos.

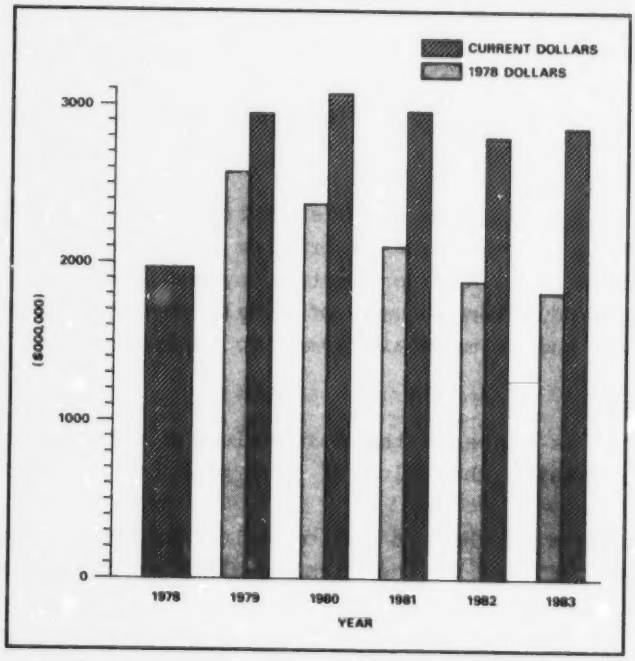

Figure 1-1. British Columbia Mineral Production, 1978-1983 (including solid minerals and natural gas and petroleum).

The increase in total value of production was primarily due to two factors: higher prices received for copper and precious metals, and increases in production of some of the major minerals such as copper, gold, lead, zinc, coal, and asbestos.

The share of solid minerals increased slightly from 67.4 per cent in 1982 to 68.5 per cent in 1983; petroleum and natural gas accounted for 31.5 per cent of the total value of mineral production in 1983, down from 32.6 per cent in 1982.

The total values for 1983 and percentage changes since 1982 for the various sectors are estimated as follows:

	1983 VALUE $	PERCENTAGE CHANGE
Metals	1 104 040 121	+4.4
Industrial Minerals	89 496 434	-6.4
Structural Materials	208 401 528	+27.0
Coal	555 789 196	-2.0
Petroleum and Natural Gas	899 351 279	-1.5
Total Value	2 857 078 558	+2.1

British Columbia continued to be Canada's leading producer of copper, molybdenum, and coal in 1983, and a major contributor to the total production of natural gas, zinc, lead, asbestos, gold, silver, and cement.

British Columbia producers of metals experienced extremely competitive markets in 1983 as a result of record-low prices of principal base metal products and continuing high production by producers in Africa and South America, where production volumes of metals were sustained to acquire foreign exchange and to maintain domestic employment regardless of prices.

Copper regained its place as the most valuable solid mineral in British Columbia by surpassing the value of coal produced in 1983.

Despite an increase in the production volume of coal, lower coal prices received during 1983 led to the first decline in the value of coal produced in the province since 1976.

There was some recovery in average unit price for copper, crude oil, silver, gold, zinc, asbestos, and sand and gravel; unit prices were lower than the 1982 level for coal, natural gas, and molybdenum.

Details of mineral production during 1983 compared to that for 1982 is shown in Table 1-1. Major mineral commodities and their proportional contributions to the total value of mineral production in British Columbia are illustrated on Figure 1-2.

TABLE 1-1. MINERAL PRODUCTION IN BRITISH COLUMBIA, 1982 and 1983

	UNITS	1982 ACTUAL QUANTITY	1982 ACTUAL VALUE $	1983 ACTUAL QUANTITY	1983 ACTUAL VALUE $
METALS					
Copper	kg	279 873 599	495 009 799	282 825 388+	559 571 421
Gold	g	7 687 515	118 269 950	7 978 914+	130 931 052
Iron concentrates	t	774 951	19 630 010	496 823-	13 078 465
Lead	kg	83 746 551	43 035 587	112 941 984+	48 778 436
Molybdenum	kg	14 747 888	154 990 970	10 178 825-	87 584 823
Silver	g	499 565 577	158 260 320	402 002 507-	179 877 966
Zinc	kg	75 182 699	63 571 543	95 286 818+	79 634 214
Others			4 720 199		4 583 744
Total Metals			1 057 488 380		1 104 040 121
INDUSTRIAL MINERALS					
Asbestos	t	76 084	57 032 422	81 653+	53 395 853
Sulphur	t	423 892	29 115 860	488 176+	24 862 954
Others			9 495 936		11 237 627
Total Industrial Minerals			95 644 218		89 496 434
STRUCTURAL MATERIALS					
Cement	t	749 571	69 265 713	853 064+	71 080 982
Sand and Gravel	t	26 702 329	65 648 899	39 560 744+	99 919 233
Others			29 242 032		37 401 313
Total Structural Materials			164 156 644		208 401 528
COAL	t	10 645 742	566 878 240	11 480 298+	555 789 196
PETROLEUM AND NATURAL GAS					
Crude oil	m^3	2 078 258	333 892 930	2 078 771	402 075 887
Natural gas to pipeline	10^3m^3	7 188 561	542 664 470	6 899 911	455 187 128
Others			36 345 155		42 088 264
Total Petroleum and Natural Gas			912 902 555		899 351 279
GRAND TOTAL			2 797 070 036		2 857 078 558

Symbols: + = production increased in 1983 relative to 1982
- = production decreased in 1983 relative to 1982

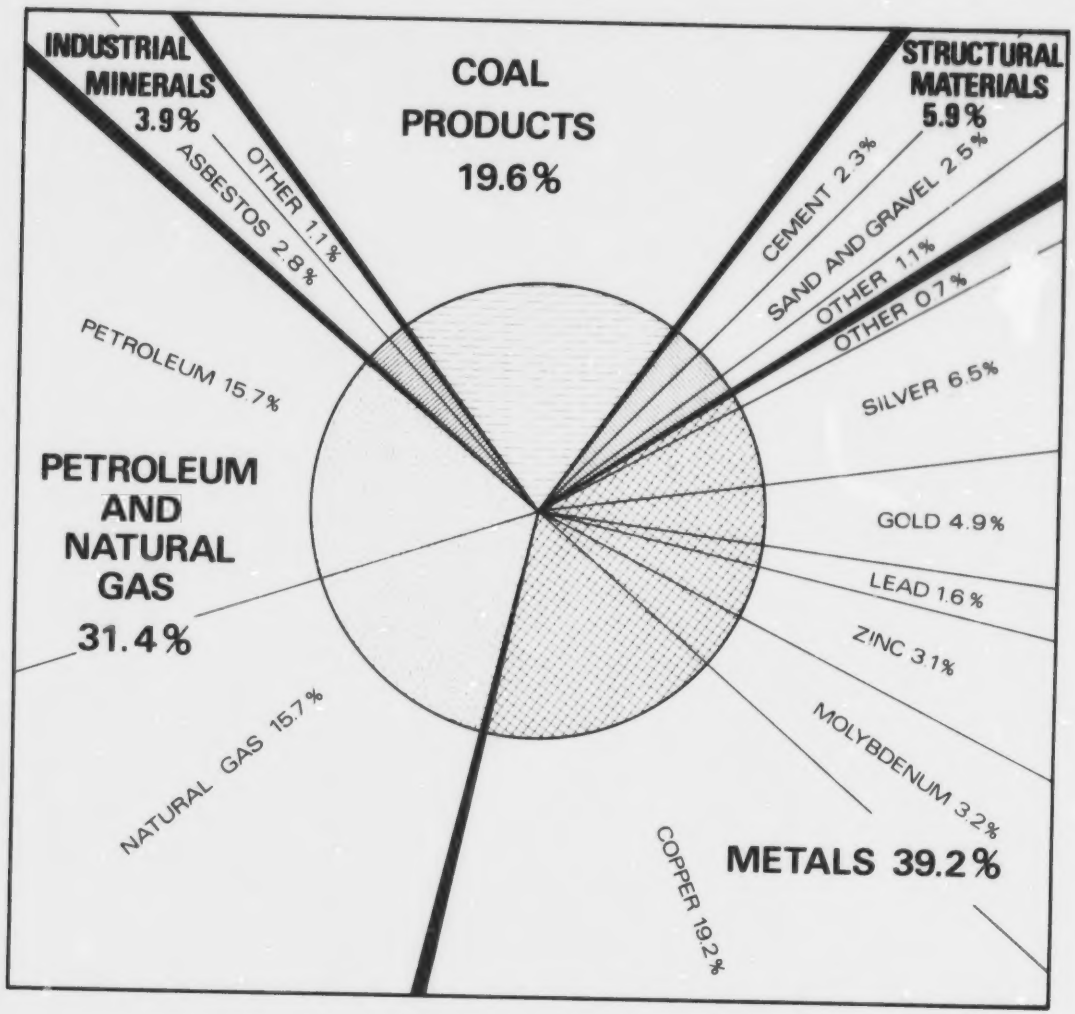

Figure 1-2. Major Mineral Commodities Produced In 1983 by value.

OUTLOOK

1983 marked the first year of recovery from the worst recession since the 1930s. However, due to the continuing pressure of surplus stocks and a strong United States dollar, the current economic recovery will have little impact on the major commodities, such as copper and molybdenum, produced in British Columbia during 1984.

Market conditions for British Columbia mineral products will likely be mixed for 1984. Demand for zinc and industrial minerals is expected to remain reasonably strong, while the outlook for most base metals is that weak prices will continue until inventories in the western world are reduced through higher consumption. Precious metals are not likely to see substantial recovery until renewed fears of high inflation return to provide additional buying incentive. Overall, the year 1984 will be one of only moderate growth.

While coal production in British Columbia is expected to be much higher in 1984 than in 1983, world coal markets are likely to remain depressed throughout 1984 reflecting a sluggish international economy. The growth in thermal coal demand is expected to be affected by reduced energy demand while metallurgical coal requirements will be limited by reduced steel production.

For the remainder of the decade, metallurgical coal markets are expected to be weak because of low economic activity and reduced steel demand. Prospects for thermal coal are good, particularly in the cement and power generation sectors of countries in the Pacific Rim and Mediterranean Europe. Competition for markets, however, will remain intense.

In the long term, the British Columbia minerals sector is challenged by projected slow growth in demand for the Province's principal products and increasing competition from producers in less developed countries, particularly in copper. New opportunities, however, exist for joint ventures and for sales of technical services.

The main areas of interest in mineral exploration during 1984 will continue to be the search for precious metal and higher grade polymetallic deposits containing zinc, lead, copper, gold, and silver.

ACTIVITIES OF THE MINERAL RESOURCES DIVISION

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INTRODUCTION

The Mineral Resources Division has had a long history of development, with its mission evolving from being simply administration of titles under the Provincial Secretary in 1859 to today's role of administering mineral placer and coal tenure systems, providing inspection and engineering services, carrying out geoscientific surveys and studies, administering guidelines to new mine development, and providing mineral economic and policy analyses and statistical data. The objectives of the Mineral Resources Division are:

- to promote orderly development of the mineral resources of British Columbia;
- to facilitate the process of discovery and renewal of the province's mineral resources;
- to administer title to the mineral resources of the province in an efficient and effective manner;
- to ensure the extraction of the province's mineral resources in a manner consistent with worker and public safety, with resource conservation, and with minimum environmental degradation;
- to provide economic and statistical information, and analytical support and policy recommendations on the mineral sector, and on emerging issues on provincial mineral sector development opportunities and problems; and
- to administer and coordinate the province's metal and coal mine review procedures.

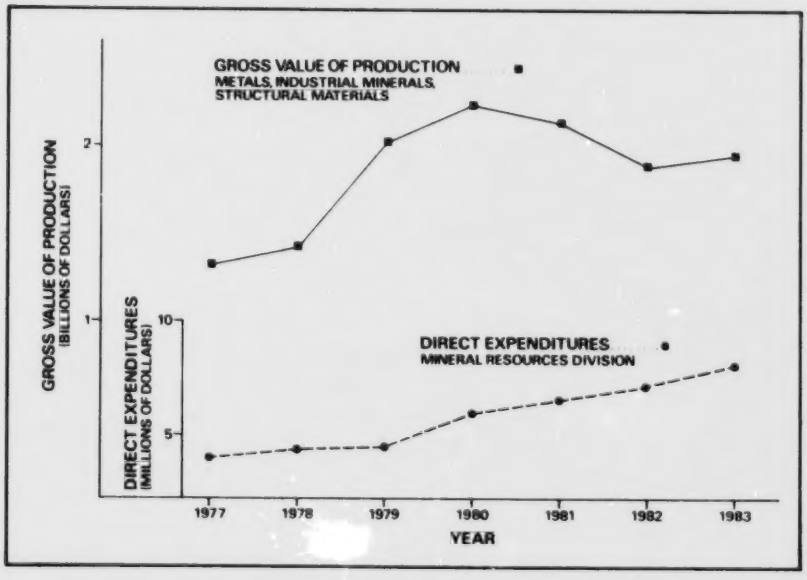
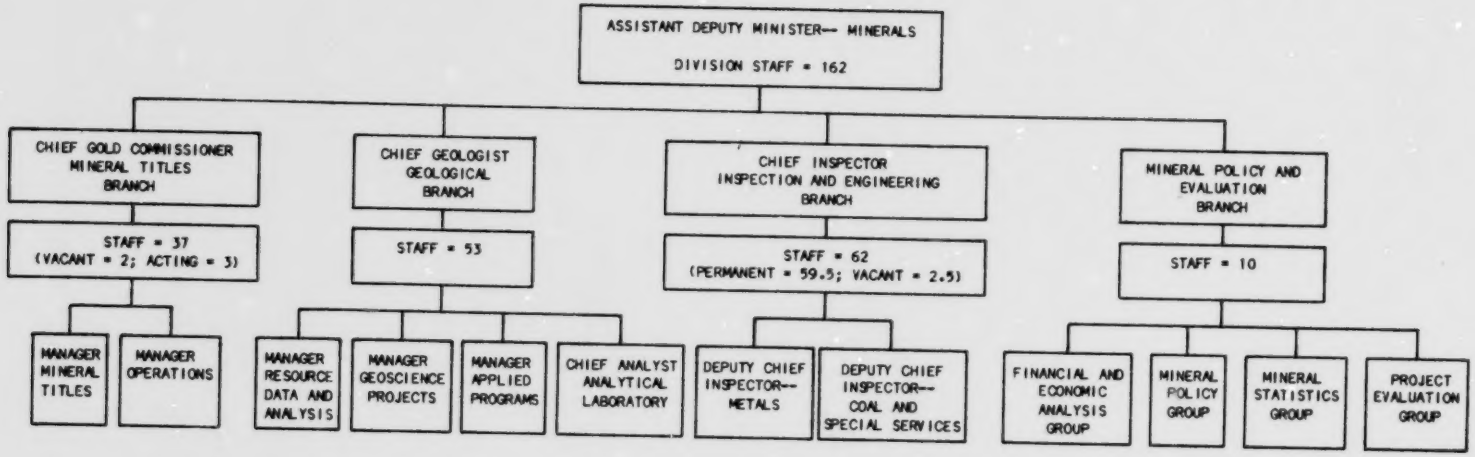


Figure 2-1. Gross value of production and direct expenditures.

TABLE 2-1. ORGANIZATION CHART

MINERAL RESOURCES DIVISION


ASSISTANT DEPUTY MINISTER-- MINERALS
DIVISION STAFF = 162
CHIEF GOLD COMMISSIONER MINERAL TITLES BRANCH
STAFF = 37 (VACANT = 2; ACTING = 3)
MANAGER MINERAL TITLES
MANAGER OPERATIONS
CHIEF GEOLOGIST GEOLOGICAL BRANCH
STAFF = 53
MANAGER RESOURCE DATA AND ANALYSIS
MANAGER GEOSCIENCE PROJECTS
MANAGER APPLIED PROGRAMS
CHIEF ANALYST ANALYTICAL LABORATORY
CHIEF INSPECTOR INSPECTION AND ENGINEERING BRANCH
STAFF = 62 (PERMANENT = 59.5; VACANT = 2.5)
DEPUTY CHIEF INSPECTOR-- METALS
DEPUTY CHIEF INSPECTOR-- COAL AND SPECIAL SERVICES
MINERAL POLICY AND EVALUATION BRANCH
STAFF = 10
FINANCIAL AND ECONOMIC ANALYSIS GROUP
MINERAL POLICY GROUP
MINERAL STATISTICS GROUP
PROJECT EVALUATION GROUP

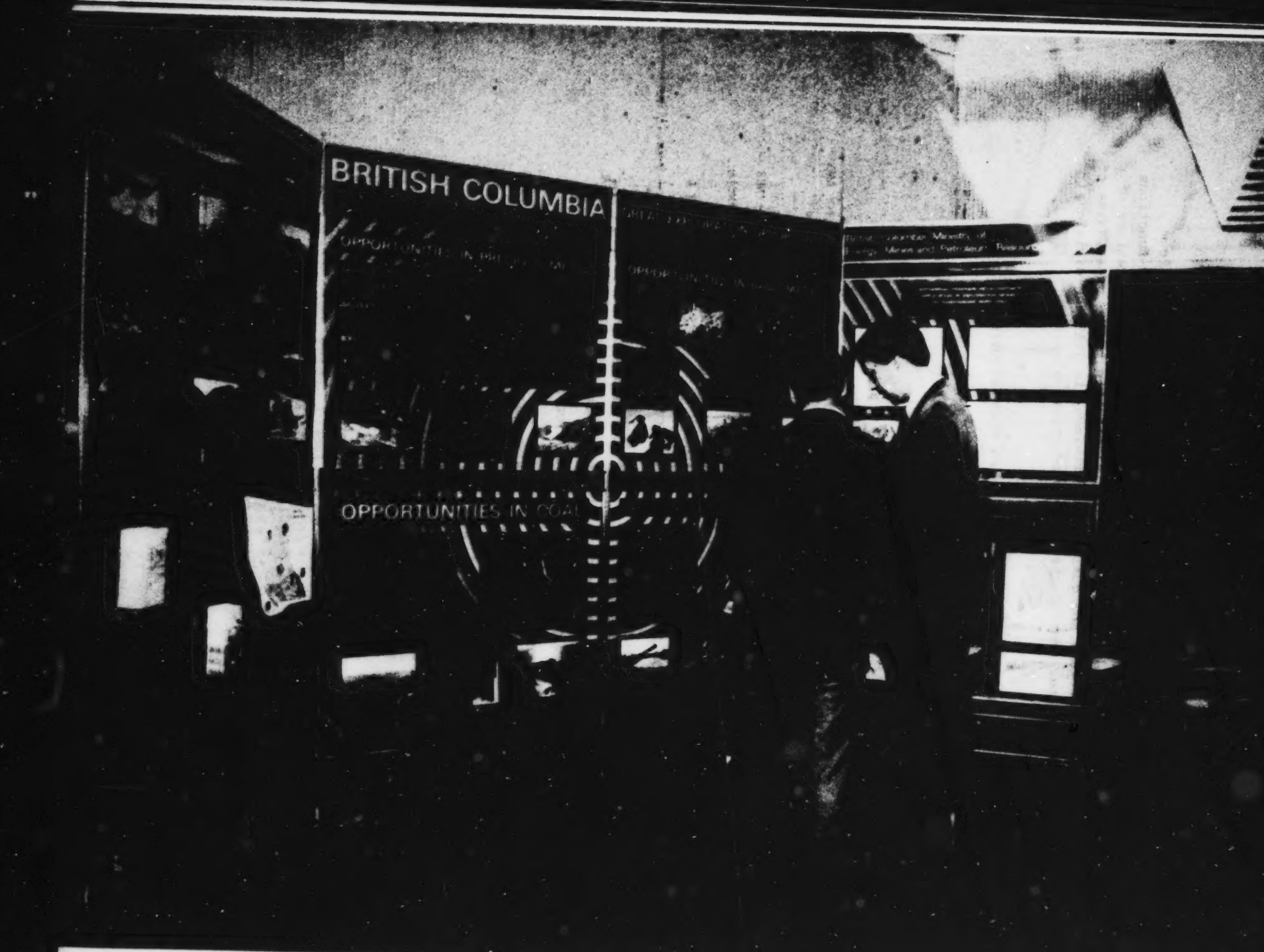
To carry out these objectives, the division is organized into four branches as shown on the organization chart (Table 2-1); their functions are summarized in Table 2-2. The budget to carry out the operations of the division is shown on Figure 2-1 in relationship to the gross value of production of minerals and coal in the province; in 1983 the divisional budget was 0.43 per cent of the gross production value.

TABLE 2-2. FUNCTIONS OF THE MINERAL RESOURCES DIVISION

MINERAL RESOURCES DIVISION
ORGANIZATION AND FUNCTIONS

ASSISTANT DEPUTY MINISTER

MINERAL TITLES	GEOLOGICAL	INSPECTION AND ENGINEERING	MINERAL POLICY AND EVALUATION
MANAGEMENT OF MINERAL, COAL, AND PLACER TITLE	COAL AND MINERALS RESOURCE INVENTORY	SAFETY ENGINEERING	MINING PROJECT REVIEW GUIDELINES
TITLES POLICY AND LEGISLATION DEVELOPMENT	GEOSCIENTIFIC SURVEYS AND MAPPING	MINER HEALTH AND SAFETY	ECONOMIC/FINANCIAL ANALYSIS
CLAIM MAP SERVICE	FIELD AID AND LIAISON	PUBLIC MINING HAZARD ABATEMENT	MINERAL POLICY DEVELOPMENT
CLAIMS INSPECTION	EXPLORATION MONITORING	MINE RESCUE TRAINING	MINE PRODUCTION STATISTICS
	MINERAL DATA-BASE MAP AND REPORT SERVICE	MINE RECLAMATION AND MINE ENVIRONMENT	INTERGOVERNMENTAL LIAISON
	LAND USE STUDIES	RESOURCE CONSERVATION	
	ANALYTICAL LABORATORY	MINERAL AND COAL DEVELOPMENT GUIDELINES	
	PROSPECTORS' ASSISTANCE	MINING ROADS	


BRITISH COLUMBIA
OPPORTUNITIES IN COAL

GEOLOGICAL BRANCH

OBJECTIVES AND ORGANIZATION

The solid mineral industries, metallic, non-metallic and coal, need to engage continuously in exploration to replace the resources currently being mined. The role of the Geological Branch is to facilitate this search in every way possible within its budget. The Branch conducts geological mapping, other geoscience surveys, resource studies, and geoscience data-base construction to provide industry with maps and information essential to intelligent exploration. Much of this same information provides the basis for government stewardship of the subsurface resources.

To carry out its objectives the branch is organized into four sections: Geoscience Projects, Applied Programs, Resource Data and Analysis, and Analytical Laboratory. Three figures summarize the organization (Table 2-4), the objectives and tasks by section (Table 2-5), and the program responsibility matrix (Table 2-3).

TABLE 2-3
GEOLOGICAL BRANCH MANAGEMENT AND ORGANIZATION MATRIX

DISCIPLINES AND INTERESTS	ORGANIZATION AND PROGRAM RESPONSIBILITY			
RESOURCE TYPE	PROJECT	APPLIED	RESOURCE DATA	LAB.
Metallic	*	*	*	*
Nonmetallic	-	-	*	+
Coal	*	*	*	*
Geothermal	-			
RESEARCH AND DEVELOPMENT				
Geoscience research	*	+	-	-
Geological surveys	*	+	-	
Geochemical surveys and control	*	-	-	*
Analytical method development	-			*
FUNCTIONS				
Land use analysis and management	-	+	*	
Resource inventory analysis and management	-	+	*	
Industry intelligence	+	*	*	
Consultation service	*	*	*	+
Data processing	-		*	-
Core storage		*		
Prospector training	+	*	-	-
Geologist training	+	*	-	
Assayer certification				*

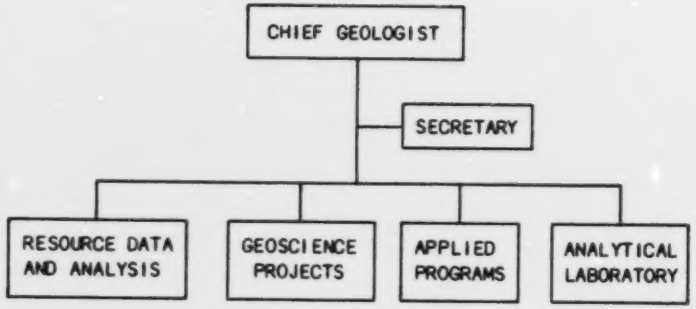
* = MAJOR ROLE; + = IMPORTANT ROLE; - = MINOR ROLE; (blank) = NO ROLE.

TABLE 2-4

ORGANIZATION, MANPOWER, AND BUDGET

GEOLOGICAL BRANCH

December 31, 1983



						GENERAL MANAGEMENT	BRANCH TOTAL
STAFF		14	16	12	9	2	53
BUDGET: IN $1000s	83/84	$664.2	$738.8	$498.4	$389.0	$97.1	$2 387.6

SUPPLEMENTARY PROGRAMS

		REGIONAL GEOCHEMICAL SURVEYS RELATED RESEARCH	PROSPECTORS' ASSISTANCE		
	83/84	100	$108.1		$208.2

GRAND TOTAL 83/84 $2 595.8

TABLE 2-5

GEOLOGICAL BRANCH

	RESOURCE DATA AND ANALYSIS	GEOSCIENCE PROJECTS	APPLIED PROGRAMS	ANALYTICAL LABORATORY
OBJECTIVES	* DATA-BASE CONSTRUCTION * LAND USE MANAGEMENT * RESOURCE DEVELOPMENT	* DEVELOP EXPLORATION DATA AND CONCEPTS * METALLOGENY AND DEPOSIT MODELLING * REGIONAL AND COMMODITY EXPERTISE	* MONITOR EXPLORATION ACTIVITY * FIELD AID TO INDUSTRY * PROSPECTOR TRAINING * LAND USE MANAGEMENT	* CHEMICAL BACK-UP * QUALITY CONTROL * ANALYTICAL RESEARCH * AID TO INDUSTRY
TASKS	INVENTORIES REPORT APPROVALS NONMETALLIC STUDIES LAND USE EVALUATIONS RESOURCE ANALYSIS	GEOLOGICAL MAPPING AND RESEARCH GEOSCIENCE REPORTS REGIONAL GEOCHEMICAL AND GEOPHYSICAL SURVEYS	EXPLORATION MONITORING AND FIELD AID BY DISTRICT GEOLOGISTS MINERAL EXPLORATION INCENTIVE PROGRAM PROSPECTOR GRANTS AND COURSES SITE-SPECIFIC LAND USE STUDIES	ASSAYS AND CHEMICAL ANALYSES ANALYTICAL RESEARCH AND METHOD DEVELOPMENT CONTROL FOR GEOCHEM PROGRAM MINERAL SEPARATIONS

TABLE 2-6
MAJOR PROJECTS IN 1983

	PROJECT	NTS AREA	MAP SCALE	GEOLOGISTS	STAGE	PUBLICATION
1.	East Kootenay Coalfields	82G	1:10 000	D. A. Grieve*	I	GF 83
2.	Purcell Supergroup (Pb, Zn, Ag)	82F, G	1:50 000	T. Höy	FC	GF 83 PM 54
3.	Sylvester K Gold-Sulphide Prospect	82E/2E		B. N. Church	FC	GF 83
4.	Coquihalla Gold Belt	92H/11, 14	1:50 000	G. E. Ray	FC	GF 81,82,83
5.	Doctors Point, Harrison Lake (Au, Ag)	92H/5, 12 92G/9	1:15 840	G. E. Ray	80%	GF 83
6.	Highmont Mine (Cu, Mo)	92I/7E	1:1200	W. J. McMillan	FC	GF 83
7.	Taseko Lakes Resource Evaluation (Co, Mo, Au)	92O/5	1:50 000	W. R. Smyth**	10%	GF 83
8.	Bowser Basin Coalfields	93L, M, 104H	1:10 000	J. Koo	50%	GF 82, 83
9.	a. Peace River Coalfields	93O, P, I	1:50 000	W. E. Kilby and A. Legun*	I	GF 83
	b. Butler Ridge	94B	1:50 000	A. Legun*	C	PM 57
10.	Stewart Area (Au, Ag, Cu)	104B/1	1:10 000	D. J. Alldrick	50%	GF 83
11.	Toodoggone Volcanic Field (Au, Ag)	94E	1:25 000	A. Panteleyev T. G. Schroeter* L. J. Diakow***	FC	GF 82, 83
12.	Aisek-Tatshenshini (Cu, Co, Au)	114P	1:20 000	D. G. Macintyre	70%	GF 83
13.	Industrial Minerals	B.C.	various	Z. D. Hora Y.T.J. Kwong+	C	GF 83
14.	Precious Metal Deposits of B.C.	B.C.	1:2 000 000	T. G. Schroeter A. Panteleyev	75%	
15.	Gold/Silver Deposits of Northern B.C.	N. B.C.		T. G. Schroeter	C	CIM Paper

* = District Geologist
** = RDA Geologist
*** = Graduate Assistant
\+ = Laboratory Mineralogist

C = Complete
FC = Fieldwork Complete
I = In Progress

GF = Geological Fieldwork
PM = Preliminary Map

DISCIPLINES AND FIELDS OF INTEREST

STAFF

On December 31, 1983 the staff included 27 geoscientists, 5 analytical chemists, 11 technical geological assistants, 3 laboratory technicians, and 6 office assistants. In addition 13 student assistants were employed during the summer. During the year the government policy of restraint brought about a reduction of overall manpower of 15 per cent from a total of 62 to 53. Reductions were accomplished by elimination of frozen positions, retirements, resignations, and lay off of contract and auxiliary staff. The former categorization of permanent and auxiliary employees no longer is used, now all staff members are calculated in terms of full time equivalents (FTEs).

The only long term employee to retire during the year was R. J. Hibberson, who was an analytical chemist with the Ministry for 36 years during which he was principally responsible for operation of the emission spectroscopic facility.

THE WORK OF THE BRANCH

The work of the branch is reviewed by section but the interrelationship and cooperative nature of the work is shown in Table 2-6. Figure 2-2 shows the various projects that were active in 1983 together with the regional geochemical survey coverage to date. The projects are principally the work of Geoscience Project Section but with contributions from the other sections.

GEOSCIENCE PROJECTS

The work of this section, directed by Dr. W. J. McMillan, is devoted principally to geological and geochemical surveys of areas important for mineral resources, and to research leading to better understanding of the origin and distribution of mineral deposits. The objective of the mapping and research is to provide the exploration industry with data and concepts that will lead to discovery of mineral and coal resources to sustain a productive mineral industry in British Columbia. The projects are designed to solve resource problems and provide geoscience data to stimulate exploration in areas of high mineral potential. As a result the mapped areas vary in size and shape. The scale used is controlled by the nature of the problem. Detailed study of the mineral deposits in an area is normally an integral part of the project. The results of these

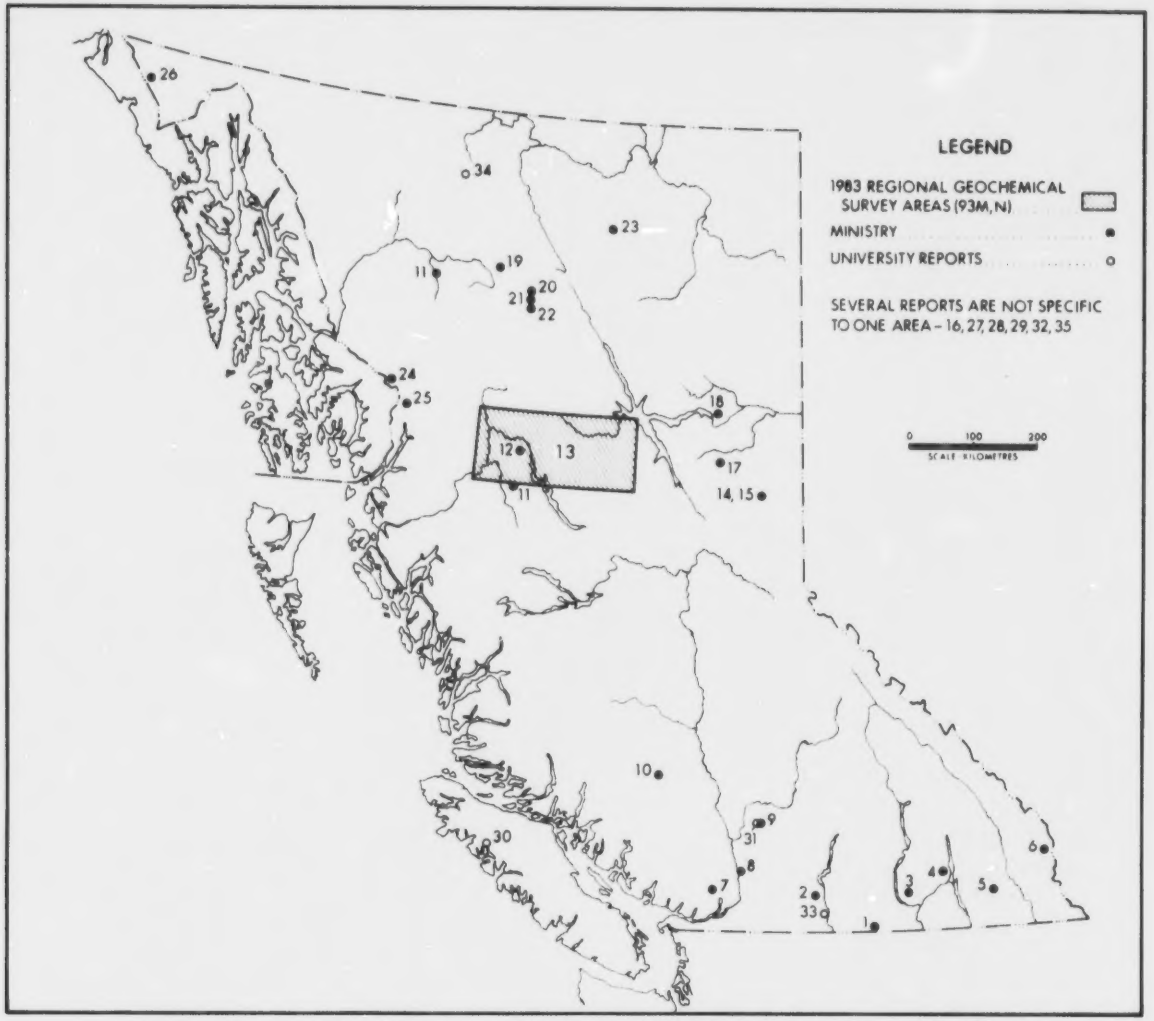


Figure 2-2. Geological Branch, regional geochemical surveys and project sites.

KEY TO PROJECTS LISTED ON FIGURE 2-2

PROJECT AND APPLIED GEOLOGY

1--Church, B.N.: Geology and Self-potential Survey of the Sylvester K Gold-Sulphide Prospect (82E/2E)
2--Church, B.N.: The Farleigh Lake Radioactive Occurrence (82E/5W)
3--Addie, G. G.: Discussion of Tillicum Mountain Self-potential Test Surveys to Date (82F/13)
4--Addie, G. G.: Amazon Mine (Ainsworth Mining Camp (82F/15)
5--Höy, T.: Structural Setting, Mineral Deposits, and Associated Alteration and Magmatism, Sullivan Camp, Southeastern British Columbia
6--Grieve, D. A.: Tonsteins: Possible Stratigraphic Correlation Aids in East Kootenay Coalfields (82G/15; 82J/2)
7--Ray, G. E., Coombe, S., and White, G.: Harrison Lake Project (92H/5, 12; 92G/9)
8--Ray, G. E.: Coquihalla Gold Belt Project (92H/11, 14)
9--McMillan, W. J.: Report on the East Pit of Highmont Operation (92I/7E)
10--Smyth, W. R.: Mineral Evaluation Study of the Cluckata Ridge Area, Taseko Lakes Map-Area (92O/3)
11--Koo, Jahsk: The Telkwa, Red Rose, and Klappan Coal Measures in Northwestern British Columbia (93L, M; 104H)
12--Schroeter, T. G.: AG Prospect (93M/7W)
13--Schmitt, H. R.: Regional Geochemical Surveys, Hazelton and Manson River Map-Areas (93M, N)
14--Kilby, W. E.: Tonsteins and Bentonites in Northeast British (93O, P, I)
15--Kilby, W. E.: The Character of the Bluesky Formation in the Foothills of Northeastern British Columbia (93O, P, I)
16--Kilby, W. E.: A Useful Micro-computer Program
17--Legun, A.: Stratigraphic and Depositional Relationships between the Bluesky Marker Unit, Gething Marine Tongue, and Upper Coal Measures of the Gething Formation (93O, P)
18--Legun, A.: Butler Ridge Map-Area, Peace River District (94B/1)
19--Schroeter, T. G.: Bill Prospect (94E/13)
20--Schroeter, T. G.: Toodoggone River Area (94E)

PROJECT AND APPLIED GEOLOGY

21--Panteleyev, A.: Stratigraphic Position of 'Toodoggone Volcanics' (94E/2, 3, 6, 7, 11, 12, 13)
22--Diakow, L. J.: Geology between Toodoggone and Chukachida Rivers (94E)
23--Legun, A.: Geologic Reconnaissance of the Wokkpash Park Proposal Area (94K)
24--Alldrick, D. J.: Geologic Setting of the Precious Metal Deposits in the Stewart Area (104B/1)
25--Alldrick, D. J. and Kenyon, J. M.: The Prosperity/Porter Idaho Silver Deposits (103P/13)
26--MacIntyre, D. G.: Geology of the Aisek-Tatshenshini Rivers Area (114P)
27--Johnson, W. M.: British Columbia Geochemical Reconnaissance Survey Data Summary
28--Hora, Z. D. and Kwong, Y.T.J.: Industrial Zeolites and Rutile
29--Hora, Z. D.: Industrial Mineral and Structural Materials

OTHER INVESTIGATIONS

30--Hansen, M. C. and Sinclair, A. J.: A Preliminary Assessment of Zeballos Mining Camp (92L)
31--Sinclair, A. J. and Bentzen, A.: A Preliminary Report on Resource Estimation using Gridded Geological Data, I: Guichon Creek Batholith (92I/6, 7, 10, 11)
32--Goldsmith, L. B. and Sinclair, A. J.: Triangular Graphs as an Aid to Metallogenic Studies of Polymetallic Vein Deposits
33--Sinclair, A. J., Moore, D., and Reinsbakken, A.: Geology of Gypo Quartz Vein, Oliver, British Columbia (82E/4)
34--Sketchley, D. A., Sinclair, A. J., and Somerville, R.: Preliminary Report on Wallrock Alteration, Erickson Gold Mine, Cassiar District (104P)
35--Matysek, P. F. and Sinclair, A. J.: Statistical Evolution of Duplicate Samples, Regional Sedimentary Surveys, British Columbia

studies lead in turn to better understanding of the geology of the British Columbian landmass that is useful for many other fields ranging from geological hazards abatement to an understanding of the chemistry of soils for forestry and agriculture.

The section cooperates with the other sections in the Branch in running projects, supervising the geochemical surveys, and aiding resource evaluation as shown in Tables 2-4 and 2-5.

After a year's absence the Regional Geochemical Stream Silt and Water Survey Program was reactivated in 1983. Happily, federal involvement was also reintroduced. The two governments cooperated without formal exchange of funds. British Columbia supplied management and supervision of the field component for both map sheets sampled and funds for sample collection in the Hazelton sheet (NTS 93M). The Geological Survey funded sampling in the Manson River sheet (NTS 93N) and paid sample preparation, and analytical and data processing costs for both areas.

Restricted field budgets in 1983 resulted in selection of projects that could be carried out with low helicopter usage and no more than one field assistant per geologist. Nevertheless a relatively effective overall program of geological survey activity was conducted. The distribution of major projects is shown on Figure 2-2 and the results of these and other projects are described in the publication *Paper 1984-1, Geological Fieldwork, 1983* released in January 1984. Other publications released during 1983 are listed in a following section.

The budget of Geoscience Project Section in 1983 was as follows: salaries, $608 506; operating costs, $130 258.

APPLIED PROGRAMS

The work of this section, directed by Dr. V. A. Preto, is devoted to practical programs based from seven district offices to aid and monitor exploration. The multifaceted job of the district geologists is the principal means by which the section carries out its program. This work includes:

- aid in the field and district office to exploration personnel;
- mineral property examinations;
- monitoring of exploration efforts and geological developments at operating mines;
- geological field mapping, commonly in cooperation with project geologists;

site specific mineral land use studies;
prospector training, grant review, and field aid; and
represent Ministry of Energy, Mines and Petroleum Resources at regional meetings.

The principal roles of the seven district geologists are to monitor mineral exploration in the province and to aid the explorationists, be they company personnel or individual prospectors. Consequently most active properties of importance were visited during the year to afford first-hand impressions. Their reports are summarized in Energy, Mines and Petroleum Resources Information Circular 1984-1, *British Columbia Mineral Exploration Review 1983*. This goal was achieved in spite of continued reduction of travel funds in a year which saw a record 106 603 mineral claims staked and 800 exploration companies active throughout the province. To fulfill their role the district geologists met with numerous explorationists in the office and in the field, and took an active part in scientific meetings by organizing these functions, presenting scientific papers, and leading field trips. Some of their contributions are listed in Table 2-6. Other activities worthy of note include assessment of the mineral potential of the Wokkpash Recreation Area by A. Legun and of the Brent Mountain Recreation Area by G.P.E. White. T. G. Schroeter was General Chairman and G. V. White, Entertainment Chairman of the Eighth Annual Meeting of Canadian Institute of Mining and Metallurgy District 6. E. L. Faulkner has undertaken the writing of a new instruction manual for prospectors.

Prospectors continued to play an important role in mineral exploration, and the section continued to devote considerable effort to prospectors' training, aid, and grants. In 1983 eight basic prospectors' courses with a total of 192 students were conducted at various centres in the province under the sponsorship of local school boards, regional colleges, and other agencies. The Seventh Annual Mineral Exploration course for prospectors was successfully held at the Cowichan Lake Forestry Research Station, April 16-30, under the direction of H. P. Wilton. Thirty-two students graduated from this 15-day advanced prospectors course which was jointly sponsored by the Ministry of Education, Malaspina College, and the Ministry of Energy, Mines and Petroleum Resources.

The prospectors' grant program continued with a budget of $100 000. Fifty-four grantees were actively exploring for minerals throughout the province. Late in the season, 12 of the most proficient and productive prospectors had their grants extended. Final results and statistics for this program are summarized in the report of the Director of Prospectors' Assistance. The accountability of grantees was increased at the beginning of the year with the issuance of written guidelines and requirements under the *Mineral Prospectors Act*.

The Applied Program Section has been responsible for coal core recovery, storage, and study at the district office at Charlie Lake. The facility contained, at the end of 1983, approximately 163 000 metres of exploration core, which is used repeatedly for stratigraphic and engineering studies by industry and government. Most comes from the Peace River Coalfield but representative core is present from most coalfields except the Crowsnest.

Applied Program's budget for 1983 was as follows: salaries, $426 114; operating funds, $72 295; Prospectors' Assistance: grants, $100 000; operating funds, $8 195.

RESOURCE DATA AND ANALYSIS

This section, directed by J. G. McArthur, is responsible for mineral and coal inventory and analysis, and for non-metallic and mineral land use studies. The inventories involve the collection, statutory approval, compilation, computerization, interpretation, and dissemination of industry derived exploration and development data. Much of this data would be lost and would need to be repeatedly reproduced at great expense were it not recovered by this section and made publically available. The industry derived data is combined with geoscience data generated by Geoscience Projects, Applied Programs, and the Geological Survey of Canada for analysis in regard to resource studies for stewardship by government and for mineral land use studies in regard to single land use alienations proposed by other ministries. In addition, the section is responsible for field-oriented studies, inventory, and advice in regard to industrial minerals and structural materials.

The major files developed during its work are:

Mineral Assessment Reports--a library in Victoria contains 11 500 reports with over 11 000 microfilmed reports available at reader/printers in Vancouver and Victoria;

Mineral Assessment Report Index--a computerized bibliographic index and map series that is updated annually;

MINFILE--a shallow level computerized information system with data on over 8 700 mineral occurrences; statistical data on mineral production and reserves; it is a companion to the Mineral Inventory Map Series;

Property Files--open files that are filed by NTS contain published and unpublished reports and maps (historical) on approximately 1 700 producers and prospects;

Coal Assessment Reports--more than 500 reports on coal exploration; non-confidential files available for viewing in Victoria;

COALFILE--comprehensive computerized coal exploration data file; operational; and

Mineral Deposit/Land Use Map Series--series of interpretive mineral potential maps.

The annual volume, *Exploration in British Columbia*, is produced chiefly by the section and is coincident with its update of MINFILE.

In addition, the section administers approximately 500 Portable Assessment Credit accounts, totalling $47 million, produces map compilations and mineral potential evaluation studies related to land use conflicts, and advises on regulations.

Field-oriented studies related to industrial minerals and structural materials are also handled by this section.

During the 1983 fieldwork season property examinations were carried out on building stone, barite, and magnesite deposits. Because of the lack of support staff, progress on aggregate, barite, and silica projects was minimal. The second phase of the Westwood Plateau aggregate study to outline and evaluate the aggregate potential of the area was assigned to an outside contractor and successfully completed. The study of rutile in mine tailings proceeded by collecting and analysing samples from mines that were active during 1982/83.

MINERAL LAND USE

A number of detailed, office-based, mineral resource assessment studies was undertaken in 1983 to assist government decisions on land use.

Reports were completed for proposed ecological reserves, official settlement plans, and a number of park proposals.

The 5-year South Moresby Planning Program was completed in 1983. The Mineral Land Use Section contributed to major sections of the report dealing with geology, mineral potential, and options for mineral resource development. The report was published early in 1984.

On-going discussions were held with Parks Branch of the Ministry of Lands, Parks and Housing to devise suitable land designations for the

proposed Chilko Lake Park that would allow continued mineral exploration in this important metalliferous area.

A comprehensive Land Use Policy Paper for the Ministry of Energy, Mines and Petroleum Resources was completed in 1983.

A 1:2 000 000-scale map showing *Areas Alienated from Mining in British Columbia, 1983* was compiled. The map depicts all types of current alienations, for example, parks and ecological reserves.

Field programs were undertaken to evaluate the mineral potential of three planning areas in 1983. District geologist Gordon White completed an assessment of the proposed Brent Mountain Recreation Area. The mineral potential was judged to be low and the Ministry dropped its objections to that plan. Ron Smyth evaluated the proposed Cluckata Ridge Ecological Reserve; a zone of pyritization was discovered and the reserve request denied. District geologist Andrew Legun began a 2-year program to assess the potential of the proposed Wokkpash Park Area.

The approximate budget of this section, distributed by function, was: Mineral Inventory, $138 637; Coal Inventory, $116 630; Industrial Minerals, $73 402; Mineral Land Use and Resource Analysis, $109 658; Computer and Consultants, $176 000; Management, $49 900; Total, $664 227. Of this total $330 732 was for permanent staff salaries.

ANALYTICAL LABORATORY

The Analytical Laboratory, under Dr. W. M. Johnson, is responsible for a complete range of analytical work in support of the projects of the Project and District Geologists of the Branch. It also provides analytical support on a wide range of topics for the Mineral Resources Division and other Government agencies such as the Consumer Taxation Branch of the Ministry of Finance, the Ministry of Industry and Small Business Development, the Ministry of Transportation and Highways, the Energy Resources Division of the Ministry of Energy, Mines and Petroleum Resources, and various commercial and mining laboratories. The laboratory is also responsible for the standards used in the Regional Geochemical Program and the quality control for that program as well as for assistance in its organization and administration. The Chief Analyst, in the capacity as Chairman of the Board of Examiners, is responsible for the certification of assayers in the province as specified in the *Ministry of Energy, Mines and Petroleum Resources Act* (sections 13 through 20).

The facilities of the laboratory include comminution and mineral separation equipment, X-ray fluorescence, atomic absorption, gamma-ray and emission spectrographic instruments, and an X-ray diffractometer. The laboratory is also capable of performing traditional fire assay and wet chemical analyses.

Dr. W. M. Johnson began a 1-year, 70-per-cent-upaid leave of absence to the University of Victoria on September 1, 1983. He is working on a research project involving the low temperature liquefaction of British Columbia coals. Mr. R. J. Hibberson retired on August 31, 1983 and Ms. Kathy Colbourne resigned on July 30, 1983. Neither position was filled.

There was a significant amount of method development and research done in the laboratory during 1983. A study on the extraction of titanium from mine tailings, laboratory computerization, work on geochemical standards, a continuation of a study of the mineralogy of the Tillicum Mountain gold deposit, and a critical review of the overall data quality of the Regional Geochemical Program are included. These studies were as follows:

- the participation of Dr. W. M. Johnson in a study into umpire analyses errors in the shipments of lead concentrates from a major Canadian firm;
- continuing development of methodology for the determination of major and trace elements using X-ray fluorescence techniques by Dr. V. Vilkos;
- a continuing combined field and laboratory study of the mineralogy of the Tillicum Mountain gold deposit by Dr. J. Kwong in conjunction with Mr. G. Addie;
- a study of the possibility of extracting titanium from the mine tailings of copper mines in the province by Dr. J. Kwong and Mr. Z. D. Hora;
- continued participation in interlaboratory standard reference material programs including supplying sample material for the purpose by Mr. B. Bhagwanani, Mr. M. A. Chaudhry, Dr. W. M. Johnson, and Mr. P. F. Ralph;
- continued participation by Dr. W. M. Johnson in Canada/Japan studies on the liquefaction of British Columbia coals;
- the development of a method by Mr. M. A. Chaudhry for the determination of barium in geological samples by atomic absorption spectrometry; and
- a summary of the Regional Geochemical Program data by Dr. W. M. Johnson designed to assist prospectors and small exploration companies determine background geochemical values in the parts of the province covered by the program to date.

CERTIFICATION

There were three Certificates of Efficiency in Assaying awarded out of a total of four candidates.

OUTPUT

Wet Chemical and X-ray Fluorescence Laboratory--There were 9 279 results reported on 1 801 samples submitted by general prospectors, Prospectors' Assistance grantees, and Ministry personnel. In addition, there were 1 189 fire assay results reported.

Emission Spectrographic Laboratory--There were 42 330 semi-quantitative determinations made on 1 485 samples and 1 271 quantitative results on 438 samples.

X-ray Diffraction Laboratory--There were 911 mineral identifications made and 120 quantitative mineral determinations.

Mineral Separation--There were 45 mineral separates prepared for subsequent analytical work.

Sample Comminution--A total of 1 406 samples was received and prepared from prospectors and Ministry personnel.

BUDGET

The laboratory's budget was: $304 974 for salaries; $44 220 for supplies and equipment; and $39 860 for travel, special services, data processing, and miscellaneous; the total was $389 054 (compared with $404 510 for the previous year).

PROFESSIONAL ACTIVITIES

The staff of the branch was active in 1983 in professional activities related to their work, including organizing and attending scientific meetings, field visits, executive activities in societies, membership in society, local and national committees, and reviewing articles for various journals.

During the year the staff played major roles in organizing two important meetings:

(1) National Joint Annual Geological Association of Canada/ Mineralogical Association of Canada/Canadian Geophysical Union meeting in Victoria, which was attended by more than 1 200 registered delegates from Canada and abroad. Staff was also involved in organizing both GAC and MAC short courses that preceded the meeting.

Staff members on the organizing committee included:
Chairman and President - A. Sutherland Brown
Field Trip Chairman - V. A. Preto
Publications Chairman and Program Committee - W. J. McMillan
Special Events Committee Chairman - A. Panteleyev
Secretary Treasurer - J. G. McArthur

Members of Various Committees - C. M. Kenyon, T. Höy, G. E. Ray, W. Kilby
MAC Short Course was coordinated by D. MacIntyre
GAC Short Course was coordinated by D. Grieve

Fieldtrips and guidebooks for the trips were provided by W. J. McMillan and V. A. Preto, B. N. Church, Z. D. Hora, T. G. Schroeter, A. Sutherland Brown, and T. Höy. In almost every case fieldtrips were co-led by industry, other government, or university geologists.

(2) CIM Annual District 6 meeting in Smithers, which was organized mainly by T. G. Schroeter and G.P.E. White of Applied Programs and R. McGinn of Inspection and Engineering Branch. Attendance was in excess of 700.

Technical presentations were made by project geologists at many meetings during the year. These reports enabled the geologists to disseminate results of their studies to the exploration fraternity less formally and with opportunity for discussion.

Among the meetings and speakers were:
Prospectors and Developers, Toronto--A. Panteleyev
Joint Annual GAC/MAC/CGU meeting, Victoria--G. E. Ray, B. N. Church, D. J. Alldrick, J. Koo
**Saskatchewan Geological Society*--G. E. Ray
**Geological Society of America, Belt Symposium*--T. Höy

*Expenses at these meetings were partly or wholly paid by the meeting organizers.

District 6 Annual Meeting, CIM, Smithers--A. Panteleyev, J. Koo, A. Matheson, G. E. Ray, D. G. MacIntyre

**Northern Resources Conference, Whitehorse*--T. G. Schroeter and A. Panteleyev

Geological Association of Canada, Vancouver and Victoria Sections--T. Höy

University of British Columbia Geology Discussion Group--A. Panteleyev

*Expenses at these meetings were partly or wholly paid by the meeting organizers.

Staff involvement in executive activities of professional societies included the following:

Canadian Institute of Mining and Metallurgy--J. G. McArthur, Chairman, Victoria Branch

Geological Association of Canada--W. R. Smyth, Chairman, Victoria Section; C. M. Kenyon, Counsellor, Victoria Section; T. Höy, Counsellor, Vancouver Section

Committee of Provincial Geologists--A. Sutherland Brown, Chairman

British Columbia Association of Professional Engineers--W. J. McMillan, Council Member

Analytical Chemistry Division of Chemical Institute of Canada--W. M. Johnson

PUBLICATIONS

The work of the branch is presented to the interested public by a series of formal publications and maps, as well as by technical talks and informal discussions. Published works include the following:

PAPERS

Paper 1984-1--*Geological Fieldwork, 1983*. A preliminary account of work of the branch presented as soon as possible after the field season includes the following reports:

Church, B.N.: Geology and Self-potential Survey of the Sylvester K Gold-Sulphide Prospect (82E/2E)

Church, B.N.: The Farleigh Lake Radioactive Occurrence (82E/5W)

Addie, G. G.: Discussion of Tillicum Mountain Self-potential Test Surveys to Date (82F/13)

Addie, G. G.: Amazon Mine (Ainsworth Mining Camp (82F/15)

Höy, T.: Structural Setting, Mineral Deposits, and Associated Alteration and Magmatism, Sullivan Camp, Southeastern British Columbia (82F, G)

Grieve, D. A.: Tonsteins: Possible Stratigraphic Correlation Aids in East Kootenay Coalfields (82G/15; 82J/2)

Ray, G. E., Coombe, S., and White, G.: Harrison Lake Project (92H/5, 12; 92G/9)

Ray, G. E.: Coquihalla Gold Belt Project (92H/11, 14)

McMillan, W. J.: Report on the East Pit of the Highmont Operation (92I/7E)

Smyth, W. R.: Mineral Evaluation Study of the Cluckata Ridge Area, Taseko Lakes Map-Area (92O/3)

Koo, Jahak: The Telkwa, Red Rose, and Klappan Coal Measures in Northwestern British Columbia (93L, M; 104H)

Schroeter, T. G.: AG Prospect (93M/7W)

Schmitt, H. R.: Regional Geochemical Surveys, Hazelton and Manson River Map-Areas (93M, N)

Kilby, W. E.: Tonsteins and Bentonites in Northeast British Columbia (93O, P, I)

Kilby, W. E.: The Character of the Bluesky Formation in the Foothills of Northeastern British Columbia (93O, P, I)

Kilby, W. E.: A Useful Micro-computer Program

Legun, A.: Stratigraphic and Depositional Relationships between the Bluesky Marker Unit, Gething Marine Tongue, and Upper Coal Measures of the Gething Formation (93O, P)

Legun, A.: Butler Ridge Map-Area, Peace River District (94B/1)

Schroeter, T. G.: Bill Prospect (94E/13)

Schroeter, T. G.: Toodoggone River Area (94E)

Panteleyev, A.: Stratigraphic Position of 'Toodoggone Volcanics' (94E/2, 3, 6, 7, 11, 12, 13)

Diakow, L. J.: Geology between Toodoggone and Chukachida Rivers (94E)

Legun, A.: Geologic Reconnaissance of the Wokkpash Park Proposal Area (94K)

Alldrick, D. J.: Geologic Setting of the Precious Metal Deposits in the Stewart Area (104B/1)

Alldrick, D. J. and Kenyon, J. M.: The Prosperity/Porter Idaho Silver Deposits (103P/13)

MacIntyre, D. G.: Geology of the Alsek-Tatshenshini Rivers Area (114P)

Johnson, W. M.: British Columbia Geochemical Reconnaissance Survey Data Summary

Hora, Z. D. and Kwong, Y.T.J.: Industrial Zeolites and Rutile

Hora, Z. D.: Industrial Minerals and Structural Materials

PRELIMINARY MAPS

Preliminary Map 51--*Geology of the Greenhills Range*, by D. Grieve and D. E. Pearson (1:10 000)

Preliminary Map 52--*Geology of the Ruby Creek-Boulder Creek Area*, by P. A. Christopher and R. H. Pinsent (1:12 000)

Preliminary Map 53--*Geology of the Barriere River-Clearwater Area*, by P. Schiarizza and V. Preto (1:50 000)

OTHER REPORTS AND MAPS

Geology in British Columbia, 1976--formerly part of the series *Geology, Exploration and Mining in British Columbia*

Exploration in British Columbia, 1979--formerly part of the series *Geology, Exploration and Mining in British Columbia*

British Columbia Geological Highway Map set--(4 maps and an information booklet

Producing Mines and Significant Mineral and Coal Deposits in British Columbia (1:2 000 000)

Areas Underlain by Economic Reserves of Coal in Southeastern British Columbia (1:250 000)

Geothermal Potential Map of British Columbia (1:2 500 000)

Johnson, W. M. and Blundell, D. A.: The Umpire Makes a Wrong Call - A Case Study, *Proceedings of the Canadian Mineral Analysts 1983 Meeting*, Kamloops, B.C.

Chaudhry, M. A.: A Rapid and Simple Method for the Determination of Barium in Geological Samples by Atomic Absorption Spectrometry, *Proceedings of the Canadian Mineral Analysts 1983 Meeting*, Kamloops, B.C.

Matheson, A.: Developments in the Peace River Coalfields, Northeastern British Columbia, *Journal of Canadian Petroleum Technology*, Vol. 22

Many external publications were produced for the GAC/MAC/CGU Annual meeting including guidebooks and short course texts.

Individual guidebooks with Branch authorship include:

Volcanology, Structure, Coal and Mineral Resources of Early Tertiary Outliers in South-Central British Columbia, by B. N. Church, T. E. Ewing, and Z. D. Hora

Copper, Molybdenum and Silver Deposits of North Central British Columbia, by N. C. Carter and T. G. Schroeter

Some Gold Deposits in the Western Canadian Cordillera, by G. E. Ray, L. W. Carlyle, R. Simpson, L. W. Saleken, J. Bellamy, J. T. Shearer, and R.J.E. Niels

Geology and Tectonic History of the Queen Charlotte Islands, by A. Sutherland Brown, C. J. Yorath, and H. W. Tipper

Mineral Deposits of Vancouver Island: Westmin Resources (Au-Ag-Cu-Pb-Zn), Island Copper (Cu-Au-Mo), Argonaut (Fe), by J. Fleming, R. Walker, and P. Wilton

Porphyry Deposits of Southern British Columbia, by W. J. McMillan, V. A. Preto, and A. E. Soregaroli

Stratabound Base Metal Deposits in Southeastern British Columbia and Northwestern Montana, by T. Höy, N. Berg, J. Balla, J. T. Fyles, J. M. Hamilton, R. L. Hauser, and P. W. Ranson

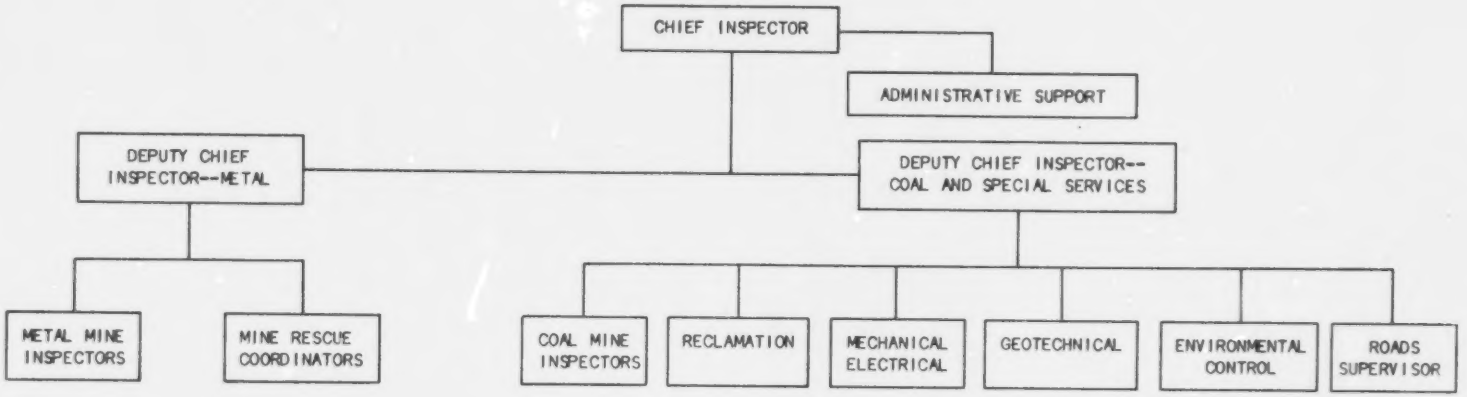
Short course texts include:

GAC Short Course, *Coal Petrography: Its Principles, Methods and Applications*, by M. Bustin, A. Cameron, D. Grieve, and W. Kalkreuth (273 pages - 40 tables, 18 plates with 127 figures, 39 of which are in full colour, and 127 other diagrams)

MAC Short Course, *Sediment-Hosted Stratiform Lead-Zinc Deposits*, edited by D. F. Sangster and D. G. MacIntyre, including the following article, *Geology and Mineral Deposits of Gataga District, British Columbia*, by D. G. MacIntyre, R. Carne, and W. Roberts

TABLE 2-7. ORGANIZATION CHART

INSPECTION AND ENGINEERING BRANCH



*PRINCE GEORGE
*SMITHERS
*NANAIMO
*KAMLOOPS
*NELSON
*VANCOUVER
*PRINCE RUPERT

*PRINCE GEORGE
*SMITHERS
*NANAIMO
*KAMLOOPS
*NELSON
*FERNIE
*VICTORIA

*VICTORIA
*PRINCE GEORGE
*FERNIE

BUDGET $ THOUSANDS 1983/84	MANAGEMENT	METAL INSPECTION (ALL MINES)	SPECIALIST SERVICES	BRANCH TOTAL	AUTHORIZED STAFFING LEVEL
	409.7	1 490.3	1 337.6	3 206.7	62 (FTEs)

INSPECTION AND ENGINEERING BRANCH

ORGANIZATION AND OBJECTIVES

The Inspection and Engineering Branch carries out activities to provide safe operations at all mines, to ensure worker health and safety, to ensure the suitable reclamation and conservation of land affected by mining and exploration, and to ensure that mining systems provide the maximum possible economic recovery of the province's mineral and coal resources. Most activities are required and carried out under the *Mines Act*, which was proclaimed on June 30, 1983, and the Mines Regulation and the Coal Mines Regulation which were enacted at the same time.

The Branch, under the direction of Chief Inspector W. C. Robinson, is organized as shown in Table 2-7. During the year, inspectors stationed at various locations inspected coal mines, metal mines, sand and gravel pits, placer mines, and quarries in accordance with the *Mines Act* and the prescribed regulations. Specialized research and support for field inspections were provided by Victoria-based professionals in the areas of reclamation, environmental control, geotechnical engineering, mechanical/electrical engineering, and coal mining. The development and maintenance of access roads into areas of promising mineral potential were administered by a roads supervisor. Mine rescue training is a continuous program administered by coordinators for areas in which mine rescue stations are located.

STAFF

On December 31, the staff consisted of 59 1/2 permanent and 2 1/2 auxiliary employees.

STAFF CHANGES

Early in 1983, J. D. McDonald was transferred to the Mineral Policy and Evaluation Branch and the position of Senior Reclamation Inspector remained unfilled.

In February, E. J. Beswick, Reclamation Inspector-Technician, was transferred to Victoria from the Vancouver office.

In April, D. Smith, Inspector of Mines and Resident Engineer in Kamloops, retired after 26 years with the Ministry.

MINE INSPECTION AND SAFETY

It is the responsibility of the Inspection and Engineering Branch, under the provisions of the *Mines Act*, Mines Regulation, and Coal Mines Regulation, to ensure that the maximum possible recovery of natural resources from mining operations is achieved while keeping personal injury and environmental disturbance to a minimum. The Branch maintains a province-wide network of district offices staffed by experienced professional personnel and supported by a team of specialist engineers based in Victoria.

Inspections are carried out at metal mines, coal mines, sand and gravel pits, placer mines, and quarries throughout the province on a regular basis by the inspection staff.

Every employee working in an underground mine or in open-pit workings is required to be under the supervision of a person holding an appropriate certificate of competency issued in accordance with the *Mines Act*. In order to obtain a certificate, a candidate has to pass an examination administered by either the coal mine or metal mine Board of Examiners. Members of these Boards are appointed from Branch staff and are responsible for ensuring that candidates meet the required standards of training and education.

In addition, miner's certificates and blasting certificates are issued by the Inspectors of Mines in the district offices.

The following is a review of the work of the various sections of the Inspection and Engineering Branch during the year.

COAL SECTION

MINE INSPECTION AND SAFETY

The Coal Section of the Inspection and Engineering Branch is responsible for carrying out inspections of all developing and operating coal mines and exploration sites. All fatal and non-fatal accidents are investigated, together with all reported dangerous or unusual occurrences. The investigations are made to establish the causes and make recommendations to prevent, or reduce, the occurrence of similar accidents or incidents at mines in the province. Environmental conditions at coal mines are monitored by Inspectors. Special attention is paid to areas where there are likely to be noise, dust, or ventilation problems.

MINE QUALIFICATIONS

The following persons formed the Board of Examiners:

V. E. Dawson, P. Eng., Deputy Chief Inspector (Coal and Special Services), Victoria;

H. J. Dennis, P. Eng., Senior Inspector of Mines (Coal), Victoria;

T. Vaughan-Thomas, P. Eng., Inspector of Mines and Resident Engineer, Prince George.

The Board was responsible for conducting examinations for the granting of First, Second, and Third Class Certificates of Competency, Mine Surveyor Certificates, and Shiftboss Certificates issued under the *Mines Act*. Four persons applied for First Class Certificates, two persons wrote the Second Class Certificate examination, and one person wrote the examination for a Surveyor's Certificate.

MINING PROJECTS

Denison Mines Ltd.'s Quintette mine and Teck Corporation's Bullmoose mine came into production during the year. Fording Coal continued to develop the Eagle Mountain project which will eventually replace the present numerous small open pits. The rate of expansion was slowed at the Line Creek and Byron Creek mines. Westar Mining's Greenhills mine came into full production during the year; further expansion to the north is planned.

On Vancouver Island, the Quinsam Coal Project was granted a Stage II "Approval in Principle", subject to a public enquiry into the environmental aspects. The Wolf Mountain underground mine project received a limited production permit for up to 50 000 tonnes and development commenced during the year.

The total production of clean coal from mines in British Columbia for the year was 11 696 505 tonnes.

ACCIDENT STATISTICS

There were seven fatal accidents during the year: six of these occurred at coal mines and three at construction operations.

The combined accident statistics for underground and open pit operations for the last five years are shown below:

TOTAL HOURS WORKED	SEVERITY RATE*	TOTAL WORK DAYS LOST
20 770 749	273	28 375

$$\text{*Severity Rate} = \frac{\text{Total days lost} \times 200\,000}{\text{Total Hours Worked}}$$

NOTE: The total work days lost includes 6 000 days for each fatality occuring at a producing mine.

There were 446 compensable accidents in 1983 compared with 294 in 1982. The highest 'single injury' cause was 'slips and falls.'

ENVIRONMENTAL CONTROL SECTION

The Environmental Control Section is responsible for the monitoring and maintenance of safe working conditions in mines with respect to dust, gases, noise, and radiation.

Monitoring of dust, ventilation, and noise conditions continued at most mining operations. Where environmental conditions were found to be unsatisfactory, management was directed to take remedial action. Audiometric testing of mine employees was continued at most mining operations. Cooperation from mine management and employees has been good.

In October a change was made from konimetric dust sampling to personal gravimetric sampling for respirable dust. The procedures are as follows:

1. a konimeter draws in a predetermined volume of air and allows it to impinge on a glass slide. The airborne dust particles in the sample are then counted under a microscope. This method of sampling gives an indication of the dust concentration at the instant the sample is taken.
2. with personal gravimetric sampling, a small portable battery-driven pump draws in air at a constant rate over a long period and deposits the dust on a pre-weighed filter. The mass of dust in the filter is

determined and the mass of free silica is obtained by chemical analysis. As the worker normally wears the sampler for a full shift, his actual exposure to dust is determined.

GEOTECHNICAL SECTION

The Geotechnical Section reviews engineering assignments relating to mining; it has been in operation since 1980. In 1983 the section concentrated on the assessment of applications to the Chief Inspector for approval of mining plans involving geotechnical concerns. Of the large number of applications reviewed, some were subsequently withdrawn or modified, and many remained under review pending submission of further information. Sixteen recommendations for approval were made.

Nineteen minesite visits were made during the year, and 21 features were inspected. Many were special investigations of stability failures and of perceived problems or incipient failures.

The number of active tailings impoundments decreased slightly in 1983 due to mine closures and indefinite shutdowns. One active mine, Carolin, was forced to temporarily suspend its operations in the spring; the tailings impoundment did not have sufficient capacity to store both tailings and natural runoff. The storage capacity was increased during the year, and operations were then resumed in a normal manner. Apart from a number of impoundments that were approaching their storage limits, no other problems were reported with tailings impoundments.

Several failures of waste rock dumps took place during the year. One large rock slide occurred at the Greenhills mine operated by Westar, and several smaller slides were reported from the Brownie dumps at Fording Coal. None of these occurrences caused appreciable damage.

The publication, *Guidelines for the Design, Construction, Operation, and Abandoment of Tailings Impoundments*, was revised and updated.

MECHANICAL/ELECTRICAL SECTION

Mechanical/electrical inspections were carried out with increased frequency during the year. Introduction of new systems and equipment, many with a high degree of automation, required added time to evaluate

the safety features incorporated in, or required with, such systems. Two examples are the fully automated production hoist installed at Westmin's H.W. shaft and the overland conveyor system at Quintette coal mine.

Many of the newer haul trucks employ all-hydraulic service brakes, in contrast to the air/hydraulic systems that were more common a few years ago. Downhill braking tests on these vehicles now include emergency brake testing as well as service brake testing. These tests are performed after a detailed review of the engineering drawings for the brake systems.

The development of the Northeast Coalfield placed a heavy demand on the resources of the section; however, cooperation received from the mining companies and contractors involved in the design and installation of equipment ensured that no delays were caused by lack of action from the section.

Technical examination of all major electrical installations at mines and quarries continued throughout the year; special attention was directed to the inspection of open pit, electrically powered mobile equipment, and the isolation procedures used during maintenance and handling of trailing cables.

RECLAMATION SECTION

In British Columbia regulations require that lands used for mining be restored to a state compatible with appropriate land use values. The Reclamation Section ensures that lands disturbed by mining are reclaimed and revegetated. Prior to any surface disturbance the Ministry requires, that a reclamation permit be issued and a security deposit retained to ensure satisfactory reclamation. The Minister issues reclamation permits for coal mines, coal exploration and metal mines; the Chief Inspector of Mines issues reclamation permits for sand and gravel pits, quarries, mineral exploration properties, and placer operations.

During the year, eight ministerial permit applications were received and four new permits issued. At year end, there were 53 metal mine, 6 coal mine, and 29 coal exploration permits. The metal mines reported a total area disturbed by mining of 13 843 hectares, of which 1 814 hectares were reclaimed. The coal mines reported a total disturbance of 7 588 hectares, of which 2 121 hectares were reclaimed. Companies engaged in exploration reported a total disturbed area of 1 166 hectares, of which 726 hectares have been reclaimed.

Reclamation permits issued by the Chief Inspector of Mines increased again this year. A total of 263 applications were processed, 236 permits were issued and 137 permits were closed. At year end a total of 879 permits existed.

Reclamation staff also work closely with members of industry and universities through the Technical and Research Committee on Reclamation. This committee actively supports reclamation research and information exchange to ensure that technological advances in reclamation are disseminated rapidly throughout the mining industry.

The annual B.C. Mine Reclamation Symposium was held again in 1983. One hundred and fifty delegates heard talks on a wide range of reclamation topics. During this symposium, the B.C. Mine reclamation award was presented to the Environmental Services of B.C. Coal (now Westar Mining Limited). Citations were presented to Crows Nest Resources Limited for coal mine reclamation, to Fording Coal Limited for exploration reclamation, and to Craigmont Mines Limited for metal mine reclamation. A special citation was presented to Dr. J. C. Errington of the Ministry's Reclamation Section for outstanding service to the Technical and Research Committee on Reclamation and technical input to mine reclamation in British Columbia.

MINE RESCUE AND FIRST AID

Stations manned by qualified mine rescue coordinators are maintained at Fernie, Nanaimo, Kamloops, Smithers, Nelson, and Prince George. Each mine rescue station is equipped with self-contained breathing apparatus equipment to equip two six-man underground teams and one six-man surface mine rescue team. In addition, the stations are equipped with auxiliary rescue and testing equipment such as ropes, stretchers, gas testers, and other gear. Major producing underground and surface mines within the province provide and maintain mine rescue equipment and supplies. The Ministry mine rescue coordinators monitor the servicing of equipment at the mines in accordance with the *Mines Act*.

Government restraint resulted in the elimination of the coordinator position in Prince George; coordinators from other offices and inspectors from the Prince George office have taken over this work in order to maintain inspections and training in the northern districts.

The type of training courses, and the number trained, assisted, or examined by the mine rescue coordinators in 1983, combined with comparable statistics for 1982, are tabulated as follows:

	1982	1983
Underground Mine Rescue Certificates.....	198	99
Underground Mine Rescue (Refreshers).....	21	47
Surface Mine Rescue Certificates.....	390	277
Surface Mine Rescue (Refreshers).....	44	69
Survival Mine Rescue Certificates.....	308	379
Gravel Pit Mine Rescue Certificates.....	19	22
St. John Standard First Aid.....	360	250
Safety Orientated First Aid.....	294	174
Underground Mine Rescue Instructor's Certificates.....	1	1
Surface Mine Rescue Instructor's Certificates.....	1	5
Survival Mine Rescue Instructor's Certificates.....	1	3

MINE SAFETY ASSOCIATIONS

The four mine safety associations established throughout the province are again commended for their efforts in promoting mine rescue, first aid training, and safety education within their respective zones. The associations are as follows:

Vancouver Island Mine and Industrial Safety Association;

Central B.C. Mine Safety Association;

East Kootenay Mine and Industrial Safety Association; and

West Kootenay Mine and Industrial Safety Association.

The associations are sponsored by the Ministry of Energy, Mines and Petroleum Resources and the Workers' Compensation Board. The association members consist of representatives from industry, the Inspection and Engineering Branch, the Workers' Compensation Board, and St. John Ambulance. One of the important functions of each association is to organize the zone competitions.

The winners of various zones went on to compete in the provincial competition in Cranbrook on June 11, 1983. Zone winners were:

ASSOCIATION	UNDERGROUND	OPEN PIT	THREE-PERSON FIRST AID
Vancouver Island Mine and Industrial Safety Association	Westmin Res. Ltd. Captain-- D. Glaeser	No Entry	Erickson Gold Mining Corp. Captain--J. Bondeson
Central B.C. Mine Safety Association			
--North Zone	No Entry	Cassiar mine Captian--D. Harrison	Quintette Coal Ltd. Captain--J. Balmer
--South Zone	No Entry	Utah Mines Ltd. (Island Copper mine) Captain--J. Pelletier	Newmont Mines Ltd. Similkameen Division Captain--L. Vandale
--Central Zone	No Entry	Cominco/Valley mine Captain--W. Maldidier	Lornex Mining Corp. Captain--J. Horvath
West Kootenay Mine and Industrial Safety Association	Westar Mining Ltd. Balmer Mine Captain--E. Taje	No Entry	No Entry
East Kootenay Mine and Industrial Safety Association	Westar Mining Ltd. Fernie #1 Captain--D. Saunders	Byron Creek Collieries Ltd. Captain--L. Robin	Cominco Ltd. (Sullivan mine) Captain--M. Boisvert

In addition to the above zone winners, a quest underground mine rescue team from Osburn, Idaho was invited to participate in the Provincial Underground event on a non-competing basis. The American Smelting and Refining Co. (Coeur mine) was captained by Mr. Dave Turcotte.

The surface and underground mine rescue competitions were judged by personnel of the Inspection and Engineering Branch. The three-person first aid event was judged by St. John Ambulance personnel.

The winners of the provincial mine rescue and three-person first aid events were as follows:

UNDERGROUND	OPEN PIT	THREE-PERSON FIRST AID
Westar Mining Ltd. Fernie #1 Captain--D. Saunders	Utah Mines Ltd. Island Copper Mine Captain--J. Pelletier	Newmont Mines Ltd. Similkameen Division Captain--L. Vandale

The winning underground and surface mine rescue teams were invited to the United States to compete in an International Competition. The underground representative, Westar Mining Ltd., captained by D. Saunders, competed at Louisville, Kentucky. The team placed 75th out of 107 teams that competed. The Island Copper surface mine rescue team out of Port Hardy, captained by J. Pelletier, competed at Gillette, Wyoming and won top honours in the event. The teams were sponsored by their respective mines.

The Canadian underground mine rescue competition, originally planned for June 25, 1983 in Yellowknife, N.W.T. was cancelled.

MINING AND PETROLEUM ROADS

Under the authority of the *Ministry of Energy, Mines and Petroleum Resources Act*, the road maintenance programs were carried out to encourage and assist in the development of mineral and fossil fuel resources in the province.

During 1983 expenditures of $218 625.00 were made to provide annual general maintenance to the Omineca Road and limited maintenance of the Takla Spur access road, and to construct a new bridge north of Johanson Lake.

A total of $137 500.00 was allocated to maintain the Sierra-Yoyo all-weather road that provides access to the main gas-producing area east of Fort Nelson. This work included grading, extensive gravelling, culvert repairs, and gravel prospecting for on-going road maintenance.

Due to budgetary restraints, the shared-cost road grant program to assist in construction or maintenance of roads or trails to mining properties, remained discontinued during 1983.

MINE DEVELOPMENT GUIDELINES

Responsibility for administration of the *Procedures for Obtaining Approval of Metal Mine Development* and the *Guidelines for Coal Development* was transferred from the Inspection and Engineering Branch to the Mineral Policy and Evaluation Branch during the year.

MINERAL POLICY AND EVALUATION BRANCH

OBJECTIVES AND ORGANIZATION

The former Mineral Economics Branch was reorganized in early 1983 to encompass the mining project review function from the Inspection and Engineering Branch. The Branch was renamed the Mineral Policy and Evaluation Branch and restructured into four groups (Table 2-8).

The Financial and Economic Analysis Group, Mineral Statistics Group, and Mineral Policy Group perform the functions of the previous Mineral Economics Branch, that is, the provision of economic, financial, and statistical analyses pertaining to provincial mineral sector policy, legislation and planning; and the collection, maintenance, and dissemination of comprehensive statistical data in support of Ministry resource management responsibilities. These major objectives are further described as follows:

- the provision of expertise on the economic aspects of mineral sector policy and planning, including assistance on the formulation of incentive programs, infrastructure support programs, taxation and tenure systems, appropriate evaluation frameworks, and provincial and intergovernmental mineral policies;

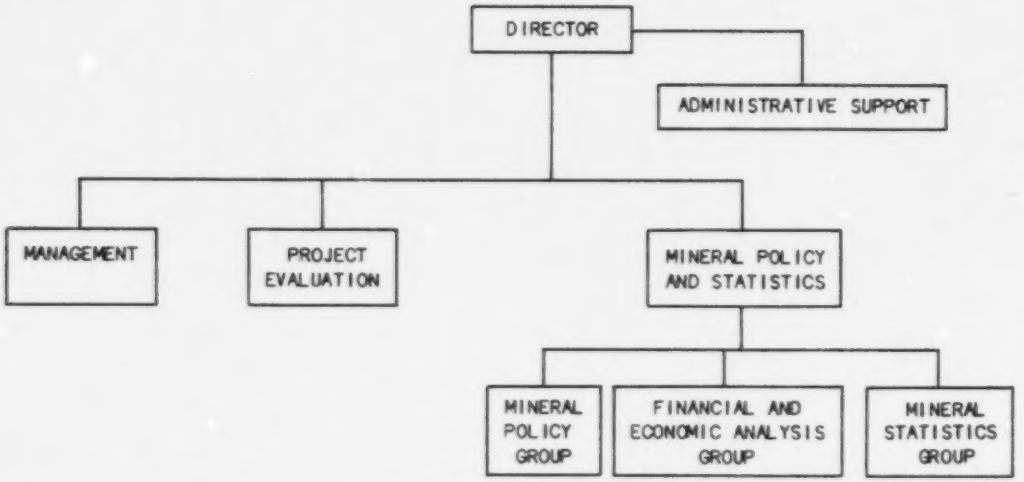
- the performance of selected mineral industry economic analyses including marketing, supply, financial, economic, and fiscal evaluations of mineral projects and government programs; environmental and socio-economic assessments; and medium to long-term forecasts;

- the collection, maintenance and dissemination of comprehensive British Columbia mineral industry statistics for use by the Branch, the Ministry, and other users. These include producing metal, coal, industrial minerals, structural materials, and placer operations, and associated production, sales, and values of commodities produced from these operations.

The Project Evaluation Group provides coordination services and administrative support for implementing the province's two main review processes for new mines: the *Guidelines for Coal Development*, and the *Procedures for Obtaining Approval of Metal Mine Development*. Through the review processes, the group identifies potential environmental, social, and economic impacts, and makes plans for adequate impact management to facilitate publicly acceptable mine development in British Columbia.

TABLE 2-8. ORGANIZATION, MANPOWER, AND BUDGET

MINERAL POLICY AND EVALUATION BRANCH



				BRANCH TOTAL
STAFF	3	2	5	12.6
BUDGET ($000)				
1983/84	$103.4	$78.2	$245.9	$427.4

The Branch is under the direction of Mr. Frank C. Basham who returned in October 1983 after a two-year posting at the Canadian High Commission in Canberra, Australia as Counsellor (Metals, Minerals, and Energy).

The functions of the four groups in the Branch are summarized in Table 2-9.

STAFF AND STAFF CHANGES

During the year, amalgamation of the Project Evaluation Group added three permanent positions to the Branch: Jake McDonald, Manager, Project Evaluation; Raymond L. Crook, Guidelines Coordinator; and Vivian Vosberg, Office Assistant.

In May 1983, John Clancy, Senior Economic Analyst and Acting Director for the Branch, accepted a new position with Mineral Titles Branch as Chief Gold Commissioner. In the interim, Jake McDonald was Acting Director until October 1983, when Frank C. Basham returned.

During the summer of 1983, Bruce Wilby returned under the Cooperative Education Employment Program to work on the revision of a coal mining project analysis that he had completed in 1982: *Taxation of Coal Mining Projects in British Columbia*, with supervision from Philippe Monier.

1983 saw two resignations from the Mineral Statistics Group: Barbara MacDonald and Vivian Prive; neither position has been filled.

The remainder of the permanent staff of the Branch was unchanged during 1983. A summary of Branch organization, manpower, and budget for 1983 is as shown in Table 2-8.

REVIEW OF ACTIVITIES

Major activity areas for the Branch during the year were as follows:

FINANCIAL AND ECONOMIC ANALYSIS GROUP

The Financial and Economic Analysis Group carried out numerous research studies and evaluations of new coal and metal mining projects. Major projects during the year included:

TABLE 2-9

ORGANIZATION AND FUNCTIONS, MINERAL POLICY AND EVALUATION BRANCH

MINERAL POLICY	ECONOMIC AND FINANCIAL ANALYSIS	MINERAL STATISTICS	PROJECT EVALUATION
Analytical support on emerging issues pertinent to provincial mineral sector development, opportunities, and problems	Financial and economic studies of the provincial and international mineral sectors to facilitate the development of policy options and to assist in economic decision making	Collection, compilation, analysis, and dissemination of monthly and annual statistics for the sector	Review of new coal and metal mining projects, and major modifications to existing mines
Information and analysis of provincial, federal, and international developments for dissemination and inclusion in policy papers, briefing materials, and Cabinet submissions	Evaluation of new coal and metal mining projects to support the ministry's coal and metal mine approval systems	Provision of statistical support for branch, division, and ministry	Process for approvals-in-principle for mining ventures (12 completed in 1983)
Development of policy options, impact analysis, and program evaluation framework	Performance of commodity studies	Publication of quarterly bulletin of mineral statistics	Critical evaluation of the review procedures (Guidelines for Coal Development and Procedures for Obtaining Approval of Metal Mine Development)
Liaison with federal and provincial governments on mineral development initiatives	Production and price forecasts for the provincial mineral sector	Assembly of statistical material for the ministry annual report	Preliminary environmental overview of developments proposed (in 1983 Northwestern British Columbia was assessed)
	Analysis of fiscal and tax measures on the mining sector		

an internal report on *Mineral Sector Current Conditions and Outlook;*

a report on the improvements to MINSIM, the Ministry's computerized metal mining financial simulation model: *MINSIM CASH Functions - A Programmer's Guide;*

financial analyses of several proposed coal projects;

update of the report *Taxation of Coal Mining Projects in British Columbia;*

financial analysis of the Northwest British Columbia mining projects for inclusion in *Northwest Economic Development Studies,* a series of detailed reports published by the Cabinet Committee on Economic Development; and

information for several special media reports on the Canadian mining industry.

MINERAL POLICY GROUP

The Mineral Policy group, with the aid of other branches in the division, continued to provide analytical support, investigation, and policy advice on a wide range of topics on current policy, legislative, and regulatory matters concerning the province's mineral sector. During 1983, these included:

the renewal of an agreement under the *Copper Smelting and Refining Incentives Act;*

various Cabinet submissions on such matters as the road maintenance grants and the amendment to the *Court Enforcement Act* with regard to product liability claims;

a study on ferrosilicon potential in British Columbia;

briefings on major mining-related subjects for the Mines Ministers' Conference and other major conferences;

reports on the Northwest Economic Development with specific emphasis on mineral development;

a status report on data collection and survey activities on the Mineral Resources Division;

background papers on the Dominion Coal Block and Federal/Provincial Mineral Subsidiary Agreement;

the Ministry's Annual Report and Summary of Operations;

provision of data and pertinent information to industry, other government agencies, and the public; and

continued provision of divisional coordination for the Mineral Resources Division and assistance with budget coordination, definition of a new management reporting system, and various special projects for the Assistant Deputy Minister.

MINERAL STATISTICS GROUP

During 1983, the Mineral Statistics group carried out its regular function -- undertaking mineral statistical surveys, collection, editing, compilation, and dissemination of all mineral production activity and data for the province on a monthly and annual basis. Much of the data that is generated by the group is shared with Statistics Canada and the Department of Energy, Mines and Resources, Ottawa. Staff in the group participate regularly in joint consultative efforts with other governments to streamline the data collection process and to improve the accuracy and validity of the mineral statistics. Monthly metal mine surveys have been computerized back to 1981; this led to greatly increased accuracy and timeliness of statistical reports.

Publication of the *B.C. Mineral Quarterly*, which contains key current and forecast indicators of performance of the mining industry, continued in 1982; it was widely distributed.

PROJECT EVALUATION GROUP

During the year, the Project Evaluation group continued to administer the two mining project review procedures.

In mid-1983, the Project Evaluation group initiated a comprehensive evaluation of the two review processes. By year end, it had identified options to significantly streamline the province's review and approvals procedures for mining projects. Considerable further effort will be directed toward streamlining in 1984.

During 1983, approvals-in-principle were granted for: extensions of three existing coal mines (Balmer, Fording, Byron Creek); two small new coal operations (Countryside and Wolf Mountain); two medium-sized new coal projects (Willow Creek and Quinsam); one large extension at an existing metal mine (Westmin); and four small new metal mines (Blackdome, gold/silver; Bralorne, gold; Banbury, gold; Rossland, gold/copper/ molybdenum). Project Evaluation staff also coordinated the preliminary environmental review of various mine-related development options in Northwestern British Columbia, culminating in publication of an environmental overview report in late 1983.

BUDGET AND STAFF

The budget for the Mineral Policy and Evaluation Branch in 1983 was $427 400. The branch staff in 1983 consisted of 10 full-time-equivalent (FTE) positions. As of December 31, the branch had nine FTEs on staff.

MINERAL TITLES BRANCH

ORGANIZATION AND OBJECTIVES

The Mineral Titles Branch of the Mineral Resources Division is under the direction of the Chief Gold Commissioner and is responsible for the administration of provincial laws relating to the acquisition of and maintenance of tenure for minerals and coal.

Branch activities can be summarized as follows:

- responsible for the issuance and management of all mineral, placer, and coal title records;
- develop and prepare appropriate mining titles legislation;
- resolve title disputes;
- provide claim map service and information;
- provide claims inspection service;
- maintain current mineral record information through 24 district offices; and
- provide prospector education material and lectures.

REVENUE AND BUDGET

The branch was responsible for collection of $6 053 227 from lode and placer fees and receipts, and $2 704 182 from coal fees and rentals.

The branch budget in 1983 was $1 003 842.

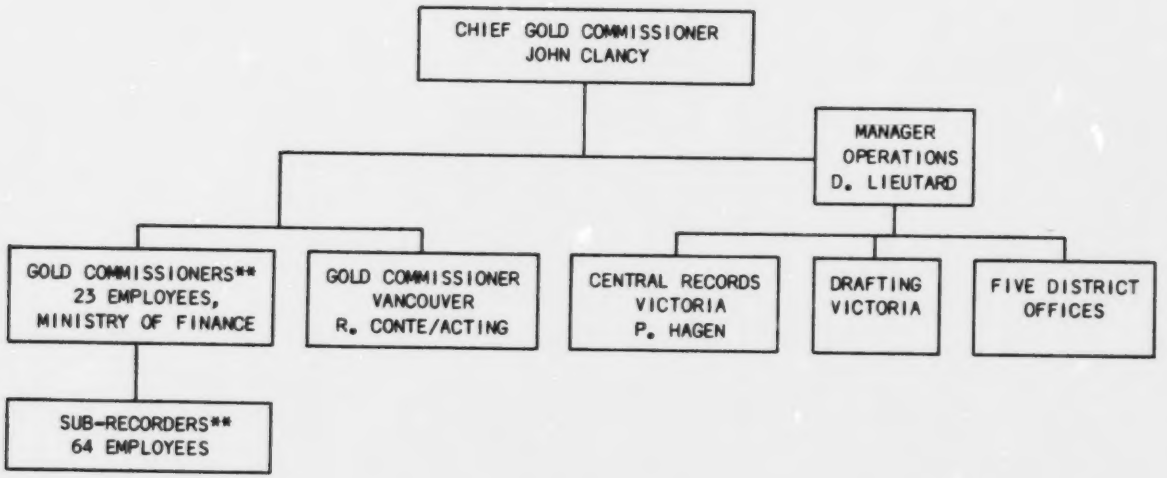
ORGANIZATION AND FUNCTION

The organization, manpower, and details of the branch in 1983 are shown in Table 2-10.

The Mineral Titles Branch, under the direction of the Chief Gold Commissioner, is responsible for administration of provincial laws and regulations relating to acquisition and maintenance of tenure for minerals and coal. Gold Commissioners and Sub-recorders are appointed for 24 mining divisions throughout the province. Staking and all work on

Table 2-10. ORGANIZATION, MANPOWER, AND BUDGET

MINERAL TITLES BRANCH



STAFF:	CENTRAL RECORDS	VANCOUVER	DRAFTING OFFICE	DISTRICT OFFICE	MANAGEMENT	BRANCH TOTAL
PERMANENT	12	10	9	3	3	37
PERMANENT VACANT	1	1	0	0	0	2
ACTING/SUBSTITUTE	2	1	0	0	0	3
BUDGET 83/84	253 891	231 682	186 097	147 235	184 937	1 003 842

**BY STATUTE SECTION 56(2) MINERAL ACT, THESE EMPLOYEES UNDER GENERAL SUPERVISION OF CHIEF GOLD COMMISSIONER.

mineral claims and placer leases must be recorded at the Gold Commissioner's office in the division where the claim or lease is located. The statistics for the Gold Commissioner's offices are shown in Table 2-11.

VICTORIA AND VANCOUVER RECORDS OFFICES

Copies of recorded mineral claims are forwarded bi-monthly to the Chief Gold Commissioner's office in Victoria; information concerning claims and leases can be obtained from this office, from the division where the property is located, or from the Mineral Titles Office in Vancouver, which maintains a duplicate record system.

Maps and records showing approximate positions of mineral claims may be viewed by the public at the Gold Commissioner's or Ministry offices. Prints of titles maps for the entire province may be obtained in Victoria and Vancouver.

In 1983, the branch received 1 787 applications for placer leases in designated placer areas. There were 30 requests for designation of additional placer mining areas during this period.

Also in the branch, the Coal Administrator is responsible for reviewing applications for coal licences and leases, and maintaining and recording coal titles records.

Currently the branch is embarked on a pilot project to computerize titles information from the Victoria and Liard Mining Divisions. Computerization of Mineral Titles Reference Maps is also underway. These projects are scheduled to continue until the entire provincial Gold Commissioner's network has been computerized; completion is scheduled for 1986.

Mineral Claims Inspectors are based at Kamloops, Smithers, Vancouver, and Nelson. Their duties include checking the locations of mineral claims to correlate them with the plotted positions of the claims, determining the validity of staking under the *Mineral Act* and *Mining (Placer) Act* and Regulations, investigations of possible misuse of mineral claims, and investigations of disputes. In order to fulfill the objectives of providing claim-holders with firm titles, and maintaining accurate and up-to-date records, the activities of the inspectors have increased with the use of the modified grid system and also as a result of the continued high volume of applications for placer leases. During 1983, as a result of 30 complaints under Section 50 of the *Mineral Act*, 29 mineral claims were cancelled.

Table 2-11. GOLD COMMISSIONER'S OFFICE STATISTICS

MINING DIVISION	FREE MINER CERTIFICATES		LODE MINING						PLACER MINING					REVENUE		
	Ind.	Co.	Mineral Claim Units	Work Nos.	Cash In Lieu $	Bills of Sale	Mining Leases	Lease Rentals $	Leases Issued	Work Nos.	Cash In Lieu $	Bills of Sale	Extn.	Free Miner Certificate $	Mining Receipts $	Total $
Alberni	81	3	2 859	1 390	36 960	61	--	466	--	--	--	1	--	3 100	85 544	88 644
Atlin	237	9	4 611	7 305	27 750	38	--	368	105	421	11 400	51	4	10 100	172 236	182 336
Cariboo	1 522	19	9 696	17 357	51 370	124	—	10 496	381	1 722	13 800	258	9	43 175	410 188	453 363
Clinton	75	1	4 370	5 758	14 960	55	--	208	26	54	900	5	--	2 000	77 616	79 616
Fort Steele	340	6	2 125	8 685	22 550	27	—	2 664	58	152	1 500	36	1	10 550	97 975	108 525
Golden	126	4	1 865	4 189	9 570	20	--	1 028	1	4	300	--	--	4 800	61 514	66 314
Greenwood	146	6	4 394	6 993	13 750	170	—	4 306	8	32	600	12	1	6 250	108 521	114 771
Kamloops	536	23	9 205	12 773	67 870	141	--	8 936	11	48	1 200	4	--	23 200	212 890	236 090
Liard	378	—	4 504	23 114	135 410	89	—	6 094	80	252	3 900	34	4	8 825	326 419	335 244
Lillooet	122	1	4 919	2 791	27 830	79	--	1 600	31	92	3 000	5	2	3 025	114 662	117 687
Nanaimo	385	9	1 941	6 530	22 660	62	—	8 204	--	3	--	--	—	12 750	79 750	92 500
Nelson	351	10	3 381	3 373	21 670	83	--	952	18	52	600	2	--	11 925	106 592	118 517
New Westminster	757	26	7 754	3 440	19 800	136	—	3 006	44	98	—	10	—	28 675	113 776	142 451
Nicola	74	--	890	1 375	22 990	37	--	1 850	--	--	--	--	--	1 700	50 760	52 460
Omineca	376	7	12 152	26 057	103 950	122	—	21 008	47	218	300	16	1	11 750	404 315	416 065
Osoyoos	253	4	2 442	2 260	60 830	46	--	6 238	--	--	--	--	--	5 975	93 594	99 569
Revelstoke	107	4	2 075	5 970	25 410	38	—	998	6	63	—	3	—	4 475	81 307	85 782
Similkameen	160	4	2 367	5 341	18 260	59	--	4 476	90	250	900	17	--	5 275	73 064	78 339
Skeena	206	5	6 692	15 463	84 810	53	—	3 922	6	17	--	--	—	6 975	208 850	215 825
Slocan	223	10	8 760	3 253	49 170	167	--	5 752	--	5	--	--	--	9 400	175 729	185 129
Trail Creek	77	1	599	540	990	5	—	854	2	--	--	--	—	1 750	10 261	12 011
Vancouver	2 691	795	2 497	6 486	16 940	61	--	4 372	--	--	--	--	--	459 125	1 995 566	2 454 691
Vernon	439	8	3 306	1 263	11 220	52	1	654	10	49	—	3	1	12 625	66 966	79 591
Victoria	594	133	3 279	3 614	11 440	50	--	80	21	37	1 200	8	--	79 250	158 457	237 707
TOTALS 1983	10 256	1 088	106 683	175 320	878 160	1 775	1	98 532	945	3 569	39 600	465	23	766 675	5 286 552	6 053 227
TOTALS 1982	10 050	810	42 305	230 317	790 350	1 107	1	111 911	1 322	4 481	53 700	547	39	481 070	3 060 412	3 541 482

COAL

The Coal Administrator is responsible to the Chief Gold Commissioner for administration of the *Coal Act*. This involves reviewing applications for coal licences and leases and maintenance of records of title.

Statistics related to coal licences for 1983 are shown in Table 2-12.

Table 2-12

STATISTICS FOR COAL LICENCES, 1983

Number of coal licence applications	176
Approximate areas of coal licence applications	49 518 hectares
Number of coal licences issued	52
Approximate areas of coal licences issued	12 744 hectares
Annual rental	$2 644 150.14
Application fees	$ 1 200.00
Cash in lieu of work	$51 872.50
Miscellaneous fees	$ 6 960.00
Total	$2 704 182.64

GOLD COMMISSIONERS

Gold Commissioners and Sub-recorders are appointed for the 24 mining divisions throughout the province and their duties are specified in writing by the Chief Gold Commissioner (Table 2-13).

Table 2-13

GOLD COMMISSIONERS

MINING DIVISION	TELEPHONE NUMBER	ADDRESS	NAME
Alberni	723-3501	4515 Elizabeth St., Port Alberni V9Y 6L5	W. G. Mundell
Atlin	651-7577	Box 100, Atlin V0W 1A0	P. S. Welock
Cariboo	992-5591	102, 350 Barlow Ave., Quesnel V2J 2C1	R. Campbell
Clinton	459-2268	Box 70, Clinton V0K 1K0	E. J. Johnstone
Fort Steele	489-3521	102 - 11th Ave. South, Cranbrook V1C 2P2	W. R. Anderson
Golden	344-5221	Box 39, Golden V0A 1H0	J. Olson
Greenwood	442-8642	Box 850, Grand Forks V0H 1H0	S. Matsuo
Kamloops	372-5233	Court House, Kamloops V2C 1E5	W. Poohachoff
Liard	387-1385	Room 412, Douglas Building, Victoria V8V 1X4	D. Doyle (Acting)
Lillooet	256-7548	Box 70, Lillooet V0K 1V0	R. E. Hall
Nanaimo	754-2111	Court House, Nanaimo V9R 5J1	R. W. Hansen
Nelson	352-2211	310 Ward St., Nelson V1L 5S4	E. McParlon
New Westminster	525-0375	100, 635 Columbia St., New Westminster V3M 1A7	T. G. Townsend
Nicola	378-6141	Box 339, Merritt V0K 2B0	L. P. Lean
Omineca	847-4411	Bag 5000, Smithers V0J 2N0	D. McMillan
Osoyoos	493-1719	Room 112, Court House, Penticton V2A 5A5	L. D. Sands
Revelstoke	837-3222	Box 380, Revelstoke V0E 2S0	D.G.B. Roberts
Similkameen	295-6957	Box 9, Princeton V0X 1W0	W. L. Marshall
Skeena	624-2121	Court House, Prince Rupert V8J 1B7	Mrs. L. Finnigan
Slocan	353-2219	Box 580, Kaslo V0G 1M0	Mrs. J. James
Trail Creek	362-7324	Box 910, Rossland V0G 1Y0	A. D. Sherwood
Vancouver	668-2672	800 Hornby St., Vancouver V6Z 2C5	Rick Conte (Acting)
Vernon	545-2387	Court House, Vernon V1T 4W5	N. G. Schulz
Victoria	385-1385	Room 412, Douglas Building, Victoria V8V 1X4	D. Doyle (Acting)

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847-7385	Box 877, Smithers V0J 2N0	Tom Jones
668-2672	800 Hornby St., Vancouver V6Z 2C5	Rick Conte
554-1445	212, 2985 Airport Dr., Kamloops V2B 7W8	Howard Turner
382-2211	403 Vernon St., Nelson V1L 4E6	Derek Moule

MINERAL RESOURCES STATISTICS

CHAPTER 3

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INTRODUCTION

The statistics of the mineral industry are collected, compiled, and tabulated for this report by the Mineral Economics Branch of the Mineral Resources Division.

In the interests of uniformity and to avoid duplication of effort, beginning with the statistics for 1925, Statistics Canada and the provincial ministries have cooperated in collecting and processing mineral statistics.

Producers of metals, industrial minerals, structural materials, coal, and petroleum and natural gas are requested to submit returns in duplicate on forms prepared for use by the province and by Statistics Canada.

As far as possible, both organizations follow the same practice in processing the data. The final compilation by Statistics Canada is usually published considerably later than the Annual Report of the Ministry of Energy, Mines and Petroleum Resources for British Columbia. Differences between the values of production published by the two organizations arise mainly because Statistics Canada uses average prices considered applicable to the total Canadian production, whereas the British Columbia mining statistician uses prices considered applicable to British Columbia production.

Peat, classified as a fuel by Statistics Canada, is not included in the British Columbia statistics of mineral production, being regarded as neither a fuel nor a mineral.

The statistics of the petroleum industry are collected, compiled, and tabulated for this report by the Petroleum Resources Branch. They are included here for comparative purposes.

METHODS OF COMPUTING PRODUCTION

The tabulated statistics are arranged to facilitate comparison of the production records for the various mining divisions, and from year to year. From time to time, revisions have been made to figures published in earlier reports as additional data became available or errors became known.

Data are obtained from the certified returns made by the producers of metals, industrial minerals and structural materials, and coal, and are augmented by data obtained from custom smelters. For petroleum, natural

gas, and liquid by-products, production figures supplied by the Petroleum Resources Branch of the Ministry of Energy, Mines and Petroleum Resources are compiled from the monthly disposition reports and the Crown royalty statement filed with the Ministry by the producers.

Values are in Canadian funds. Metric weights are used throughout.

METALS

AVERAGE PRICES

The prices used in the valuation of current and past production of gold, silver, copper, lead, and zinc are shown in the table on page 85.

Prior to 1974 the price of gold used was the average Canadian Mint buying-price for fine gold.

The price used for placer gold originally was established arbitrarily at $17 per ounce, when the price of fine gold was $20.67 per ounce. Between 1931 and 1962 the price was proportionately increased with the continuously changing price of fine gold. Since 1962, Canadian Mint reports giving the fine-gold content have been available for all but a very small part of the placer gold produced, and until 1973 the average price listed is derived by dividing ounces of placer gold into total amount received. Starting in 1974 the price used for the valuation of gold, lode and placer, is the amount received by the producer.

Prior to 1949 the prices used for silver, copper, lead, and zinc were the average prices at the markets indicated in the table on page 85, converted into Canadian funds. The abbreviations in the table are Mont. = Montreal; N.Y. = New York; Lon. = London; E. St. L. = East St. Louis; and U.S. = United States.

Starting in 1949 the price of silver, copper, lead, and zinc were average United States prices converted into Canadian funds. Average monthly prices were supplied by Statistics Canada from figures published in the Metal Markets section of Metals Week. Specifically, for silver it was the New York price; for lead it was the New York price; for zinc it was the price at East St. Louis of Prime Western; for copper it was the United States export refinery price. Commencing in 1970 the copper price is the average of prices received by the various British Columbia shippers and since 1974 this applies also to gold, silver, lead, zinc, and cadmium.

For antimony and bismuth the average producers' price to consumers is used. For nickel the price used is the Canadian price set by Inco Limited. The value per tonne of the iron ore used in making pig iron at Kimberley was an arbitrary figure, being the average of several ores of comparable grade at their points of export from British Columbia.

GROSS AND NET CONTENT

The gross content of a metal in ore, concentrate, or bullion is the amount of the metal calculated from an assay of the material, and the gross metal contents are the sum of individual metal assay contents. The net contents are the gross contents less smelter and refinery losses.

In past years there have been different methods used in calculating net contents, particularly in the case of one metal contained in the concentrate of another. The method established in 1963 is outlined in the following table. For example, the net content of silver in copper concentrates is 98 per cent of the gross content, of cadmium in zinc concentrates is 70 per cent of the gross content, etc. Commencing in 1974 the quantities represent the actual net quantities of metals paid for.

	LEAD CONCENTRATES Per Cent	ZINC CONCENTRATES Per Cent	COPPER CONCENTRATES Per Cent	COPPER-NICKEL CONCENTRATES Per Cent	COPPER MATTE Per Cent
Silver	98	98	98	--	--
Copper	Less 26 lb./ton	--	Less 10 lb./ton	85	Less 10 lb./ton
Lead	98	50	--	--	50
Zinc	50	90	--	--	--
Cadmium	--	70	--	--	--
Nickel	--	--	--	88	--

VALUE OF PRODUCTION

For indium, iron concentrate, mercury, molybdenum, rhenium, and tin the value of production is the amount received by the shippers.

For gold, silver, copper, lead, zinc, antimony, bismuth, cadmium, some iron concentrate, and nickel the value of production was calculated from the assay content of the ore, concentrate, or bullion less appropriate smelter losses, and an average price per unit of weight. Since 1974 the values represent the settlement values received by the producers for the respective metals.

Prior to 1925 the value of gold and copper produced was calculated by using their true average prices and, in addition, for copper the smelter loss was taken into account.

The value of other metals was calculated from the gross metal content of ores or concentrates by using a metal price which was an arbitrary percentage of the average price, as follows: silver, 95 per cent; lead, 90 per cent; and zinc, 85 per cent.

It is these percentages of the average price that are listed in the table on page 85.

For 1925 to 1973 the values had been calculated by using the true average price (see page 85) and the net metal contents in accordance with the procedures adopted by Statistics Canada and the Ministry of Energy, Mines and Petroleum Resources.

Since 1974 the total quantity and value of metal production include the quantities paid for to the mines, and the smelter and refinery production that can be attributed to the mines but is not paid for. The quantity and value paid for to the mines, excluding outward transportation costs, smelting and refining costs, penalties and deductions, are shown separately for comparative purposes.

INDUSTRIAL MINERALS AND STRUCTURAL MATERIALS

The values of production of industrial minerals and structural materials are approximately the amounts received at the point of origin.

COAL

The value of production of coal is calculated using a price per tonne which is the weighted average of the f.o.b. prices at the mine for the coal sold.

PETROLEUM AND NATURAL GAS

The values of production of natural gas, natural gas liquid by-products, and petroleum including condensate/pentanes plus are the amounts received for the products at the well head.

NOTES ON PRODUCTS LISTED IN THE TABLES

Antimony--Antimony metal was produced at the Trail smelter from 1939 to 1944; since 1944 it has been marketed alloyed with lead. The antimony is a by-product of silver-lead ores. In 1907 the first recorded antimonial ore mined in British Columbia was shipped from the Slocan area to England. Since then other out-of-province shipments have originated in the Bridge River, North Lardeau, Slocan, Spillimacheen, and Stuart Lake areas. In Table 3-7C the antimony assigned to individual mining divisions is the reported content of ore exported to foreign smelters; the antimony "not assigned" is that recovered at the Trail smelter from various ores received there. *See* Tables 3-1, 3-3, and 3-7C.

Arsenious Oxide--Arsenious oxide was recovered at foreign smelters from arsenical gold ores from Hedley between 1917 and 1931, and in 1942, and from the Victoria property on Rocher Deboule Mountain in 1928. No production has been recorded since 1942. *See* Tables 3-1 and 3-7D.

Asbestos--British Columbia has produced asbestos since 1952 when the Cassiar mine was opened. All British Columbia production consists of chrysotile from the Cassiar mine near the Yukon boundary. This deposit is noted for its high percentage of valuable long fibre and for the low iron content of the fibre. The original claims were located at Cassiar in 1950, and the first fibre was shipped two years later. The fibre is milled from the ore at Cassiar and now most is shipped by truck to Stewart. From 1953 to 1961 the fibre was valued at the shipping point in North Vancouver, but beginning in 1962 it has been valued at the mine, and values for the preceding years have been recalculated on that basis. *See* Tables 3-1, 3-3, and 3-7D.

Barite--Barite production began in 1940 and has been continuous since then, coming from several operations in the upper Columbia River valley. Some barite has been mined from lode deposits and the rest recovered from the mill-tailings ponds of the former Silver Giant and Mineral King silver-lead-zinc mines. *See* Table 3-7D.

Bentonite--Small amounts of bentonite were produced between 1926 and 1944 from deposits in the coal measures near Princeton. There has been no production since 1944. *See* Tables 3-1 and 3-7D.

Bismuth--Since 1929 the Trail smelter has produced bismuth. It is a by-product of lead refining and thus the production cannot be assigned to specific properties or mining divisions. *See* Tables 3-1, 3-3, and 3-7C.

Brick--*See* Clay and Shale Products.

Building Stone--Dimensional stone for building purposes is quarried when required from a granite deposit on Nelson Island and an andesite deposit on Haddington Island. Other stone close to local markets is quarried periodically or as needed for special building projects. *See* Tables 3-1, 3-3, and 3-7E.

Butane--Butane is recovered as a by-product at the gas-processing plant at Taylor and at oil refineries. *See* Tables 3-1, 3-3, and 3-7A.

Cadmium--Cadmium has been recovered as a by-product at the Trail zinc refinery since 1928. It occurs in variable amounts in the sphalerite of most British Columbia silver-lead-zinc ores. In Table 3-7C the cadmium assigned to individual mining divisions is the reported content of custom shipments to the Trail and foreign smelters; that "not assigned" is the remainder of the reported estimated recovery at the Trail smelter from British Columbia concentrates. *See* Tables 3-1, 3-3, and 3-7C.

Cement--Cement is manufactured from carefully proportioned mixtures of limestone, gypsum, and other mineral materials. It has been produced in British Columbia since 1905. Present producers are Inland Cement Industries Ltd., with a 907 180-tonnes-per-year plant on Tilbury Island, and Canada Cement Lafarge Ltd., with a 476 000-tonnes-per-year plant on Lulu Island and a 191 000-tonnes-per-year plant at Kamloops. *See* Tables 3-1, 3-3, and 3-7E.

Chromite--Two shipments of chromite are on record, 608 tonnes from Cascade in 1918 and 114 tonnes from Scottie Creek in 1929. *See* Tables 3-1 and 3-7C.

Clay and Shale Products--These include brick, blocks, tile, pipe, pottery, lightweight aggregate, and pozzolan manufactured from British Columbia clays and shales. Common red-burning clays and shales are widespread in the province, but better grade clays are rare. The first recorded production was of bricks at Craigflower in 1853 and since then plants have operated in most towns and cities for short periods. Local surface clay is used at Haney to make common red brick, tile, and flower pots. Shale and fireclay from Abbotsford Mountain are used to make firebrick, facebrick, sewer pipe, flue lining, and special fireclay shapes in plants at Kilgard, Abbotsford, and South Vancouver. A plant at Quesnel makes pozzolan from burnt shale quarried south of Quesnel. Several hobby and art potteries and a sanitary-ware plant are in operation, but these use mainly imported raw materials and their production is not included in the tables. *See* Tables 3-1, 3-3, and 3-7E.

Coal--Coal is almost as closely associated with British Columbia's early history as is placer gold. Coal was discovered at Suquash on Vancouver Island in 1835 and at Nanaimo in 1850. The yearly value of coal production passed that of placer gold in 1883 and contributed a major part of the total mineral wealth for the next 30 years.

First production, by mining divisions: Cariboo, 1942; Fort Steele, 1898; Kamloops, 1893; Liard, 1923; Nanaimo, 1836; Nicola, 1907; Omineca, 1918; Osoyoos, 1926; Similkameen, 1909; and Skeena, 1912.

The Nanaimo and Comox fields produced virtually all of the coal until production started from the Crowsnest field in 1898. The Crowsnest field contains coking coal and prospered in the early years of smelting and railroad building. Mining started in the Nicola-Princeton Coalfield in 1907, at Telkwa in 1918, and on the Peace River in 1923. The Nanaimo field was exhausted in 1953 when the last large mines closed, and only small operations on remnants were left. The colliery at Merritt closed in 1945 and at Coalmont in 1940. The closing of the large mine at Tsable River in 1966, and the last small one, near Wellington in 1968, marked the end of continuous production from the important Vancouver Island deposits. Recent exploration indicates the possibility of renewed coal mining on the island.

Undeveloped fields include basins in the foothills of the Rocky Mountains south of the Peace River, the Groundhog basin in north-central British Columbia, the Hat Creek basin west of Ashcroft, and Sage Creek basin southeast of Fernie.

The enormous requirements for coking coal in Japan created intense exploration in various areas of British Columbia since 1968. The signing of large contracts with the Japanese resulted in preparations for production at several deposits in the East Kootenays. First shipments to Japan via special port facilities at North Vancouver and Roberts Bank began in 1970. Production from the Northeast Coalfields began in 1983 with shipments being made through the port of Prince Rupert.

All the coal produced, including that used in making coke, is shown as primary mine production. Quantity from 1836 to 1909 is gross mine output and includes material lost in picking and washing. From 1910 the quantity is the amount sold and used, which includes sales to retail and wholesale dealers, industrial users, and company employees; coal used under company boilers, including steam locomotives; and coal used in making coke. *See* Tables 3-1, 3-3, 3-7A, 3-8A, and 3-8B.

Cobalt--In 1928 a recovery of 1,730 pounds of cobalt was made from a shipment of arsenical gold ore from the Victoria mine on Rocher Deboule

Mountain. From 1971 to 1973, cobalt was shipped from the Pride of Emory mine at Hope. *See* Tables 3-1 and 3-7C.

Coke--Coke is made from special types of coal. It has been produced in British Columbia since 1895. Being a manufactured product, its value does not contribute to the total mineral production as shown in Table 3-1. Up to 1966, coke statistics had been included in the Annual Report as Table 3-9, but this table has been discontinued. The coal used in making coke is still recorded in Table 3-8B.

Condensate--(a) *Field*--Field condensate is consists of liquid hydrocarbons separated and recovered from natural gas in the field before gas processing. (b) *Plant*--Plant condensate is the hydrocarbon liquid extracted from natural gas at gas-processing plants. *See* Tables 3-1, 3-3, and 3-7A.

Copper--From 1935 to 1978 no copper smelter operated in British Columbia and most of the copper concentrates were shipped to Japanese, eastern Canadian, and American smelters. From 1978 to 1983, Afton Mines Ltd. produced blister copper from its own concentrates. Most of the smelting in British Columbia in early years was done on ore shipped directly from the mines without concentration, but modern practice is to concentrate the ore first. Small amounts of gold and silver are commonly present and add value to the ore.

Ore was smelted in British Columbia first in 1896 at Nelson (from Silver King mine) and at Trail (from Rossland mines), and four and five years later at Grand Forks (from Phoenix mine) and Greenwood (from Mother Lode mine). Later, small smelters were built in the Boundary district and on Vancouver and Texada Islands, and in 1914 the Anyox smelter was blown in. Copper smelting ceased in the Boundary district in 1919, at Trail in 1929, and at Anyox in 1935. British Columbia copper concentrates were then smelted mainly at Tacoma, and since 1961 have gone chiefly to Japan.

Most of the production has come from southern British Columbia--from Britannia, Copper Mountain, Greenwood, Highland Valley, Merritt, Nelson, Rossland, Texada Island, and Vancouver Island, although a sizable amount came from Anyox and some from Tulsequah. During the 1960's, exploration for copper became intense, interest being especially directed toward finding very large, low-grade deposits suitable for open-pit mining. The activity has resulted in the establishment of operating mines at Merritt (Craigmont) in 1961, in Highland Valley (Bethlehem) in 1962, on Babine Lake (Granisle) in 1966, near Peachland (Brenda) in 1970, Stewart (Granduc)--closed mid-1978 but reopened in late 1980, near Port Hardy

(Island Copper) in 1971, near Babine Lake (Bell), McLeese Lake (Gibraltar), Highland Valley (Lornex), Princeton (Ingerbelle) in 1972, and near Kamloops (Afton) in 1977. *See* Table 3-12 for a complete list of copper producers. The Highmont mine in the Highland Valley commenced shipments in 1981.

Some of these mines have produced molybdenum as a by-product, for example, Bethlehem, Brenda, Highmont, Lornex, Gibraltar, and Island Copper. Copper is also produced as a by-product of iron mining at Tasu Sound, Queen Charlotte Islands (Wesfrob), and with ores containing zinc, gold, silver, lead, and cadmium, at Buttle Lake (Lynx and Myra, Western Mines).

Copper has been the most valuable single commodity of the industry since 1966 except in 1977, 1979, 1981 and 1982 when it was surpassed by natural gas and coal. *See* Tables 3-1, 3-3, 3-6, and 3-7B.

Crude Oil--Production of crude oil in British Columbia began in 1955 from the Fort St. John field, but was not significant until late in 1961, when the oil pipeline was built to connect the oil-gathering terminal at Taylor to the Trans Mountain Oil Pipe Line Company pipeline near Kamloops.

In Tables 3-1, 3-3, and 3-7A, quantities given prior to 1962 under "petroleum, crude" are total sales, but since 1962 the field and plant condensates are listed separately. Table 3-14 incorporates all revisions since the commencement of production.

Diatomite--Relatively large deposits of diatomite are found near the Fraser River in the Quesnel area, and small deposits are widespread throughout the province. Small amounts of diatomite have been shipped from Quesnel periodically since 1928. A plant to process the material is located in Quesnel. *See* Table 3-7D.

Fluorite (Fluorspar)--Between 1918 and 1929, fluorite was mined at the Rock Candy mine north of Grand Forks for use in the Trail lead refinery. From 1958 to 1968, small quantities were produced as a by-product at the Oliver silica quarry. *See* Table 3-7D.

Flux--Silica and limestone are added to smelter furnaces as flux to combine with impurities in the ore and form a slag which separates from the valuable metal. In the past, silica was shipped from Grand Forks, Oliver, and the Sheep Creek area. Today, silica from near Kamloops and limestone, chiefly from Texada Island, are produced for flux. Quantities have been recorded since 1911. *See* Tables 3-1, 3-3, and 3-7D.

Gold, Lode--Gold has played an important part in mining in the province. The first discovery of lode gold was on Moresby Island in 1852, when some gold was recovered from a small quartz vein. The first stamp mill was built in the Cariboo in 1876, and it seems certain that some arrastras (primitive grinding mills) were built even earlier. These and other early attempts were short-lived, and the successful milling of gold ores began about 1890 in the southern part of the province. By 1900 the value of gold production was second only to that of coal. At the start of World War II, gold mining attained a peak yearly value of more than $22 million, but since the war it has dwindled until developments in the 1970's.

In the early years, lode gold came mostly from the camps of Rossland, Nelson, McKinney, Fairview, Hedley, and also from the copper and other ores of the Boundary district. A somewhat later major producer was the Premier mine at Stewart. In the 1930's the price of gold increased and the value of production soared, new discoveries were made and old mines were revived. The principal gold camps, in order of output of gold, have been Bridge River, Rossland, Portland Canal, Hedley, Wells, and Sheep Creek. In 1971 the Bralorne mine at Bridge River closed.

Since the closing of the Bralorne mine, most of the lode gold is produced as a by-product of copper, copper-zinc-silver, and other base metal mining. Because of the volume of this production the amount of gold produced is still at a fairly high level, and with the significant rise in the price of gold in the 1970's the value of production has exceeded the peaks reached during the era of gold mines in the 1930's. With the new high prices for gold, interest has reawakened in vein and bulk gold properties with new producing mines like Carolin, Baker, Erickson and Morris Summit (Scottie Gold). *See* Tables 3-1, 3-3, 3-6, and 3-7B. *See* Table 3-12 for a complete list of current producers.

Gold, Placer--The early explorations and settlement of the province followed rapidly on the discovery of gold-bearing placer creeks throughout the country. The first placer-miners came in 1858 to mine the lower Fraser River bars upstream from Yale.

The year of greatest placer-gold production was 1863, shortly after the discovery of placer gold in the Cariboo. Another peak year in 1875 marked the discovery of placer on creeks in the Cassiar. A minor peak year was occasioned by the discovery of placer gold in the Granite Creek area in the Tulameen in 1885. A high level of production ensued after 1899, when the Atlin placers reached their peak output. Other important placer-gold camps were established at Goldstream, Fort Steele, Rock Creek, Omineca River, and Quesnel River. The last important strike was made on Cedar

Creek in 1921; coarse gold was found on Squaw Creek in 1927, and on Wheaton Creek in 1932.

Mining in the old placer camps revived during the 1930's under the stimulus of an increase in the price of fine gold from $20.67 per ounce to $35 per ounce in United States funds. Since World War II, placer mining declined under conditions of steadily rising costs and a fixed price for gold but is showing signs of revival in response to a freely floating gold price since 1972. Since 1858, more than 163 966 618 grams valued at $111.9 million has been recovered.

A substantial part of the production, including much of the gold recovered from the Fraser River upstream from Yale (in the present New Westminster, Kamloops, and Lillooet Mining Divisions) and much of the early Cariboo production, was mined before the original organization of the Department of Mines in 1874. Consequently, the amounts recorded are based on early estimates and cannot be accurately assigned to individual mining divisions.

The first year of production for major placer-producing mining divisions was: Atlin, 1898; Cariboo, 1859; Liard, 1873; Lillooet, 1858; Omineca, 1869.

In 1965, changes were made in the allocation of placer gold in New Westminster and Similkameen Mining Divisions and "not assigned," to reconcile those figures with data incorporated in Bulletin 28, *Placer Gold Production of British Columbia*. *See* Tables 3-1, 3-3, 3-6, and 3-7A.

Granules--Rock chips used for bird grits, exposed aggregate, roofing, stucco, dash, terrazzo, etc., have been produced in constantly increasing quantities since 1930. Plants operate in Burnaby and near Grand Forks, Sirdar, Vananda, and Armstrong. *See* Tables 3-1, 3-3, and 3-7D.

Gypsum and Gypsite--Production of gypsum and gypsite has been recorded since 1911. Between 1925 and 1956, more than 907 000 tonnes were shipped from Falkland and some was quarried near Cranbrook and Windermere. Since 1956, nearly all production has come from Windermere. *See* Tables 3-1, 3-3, and 3-7D.

Hydromagnesite--Small shipments of hydromagnesite were made from Atlin between 1904 and 1916 and from Clinton in 1921. *See* Tables 3-1 and 3-7D.

Indium--Production of indium as a by-product of zinc refining at the Trail smelter began in 1942. Production figures have not been disclosed since 1958.

Iron--Iron ore was produced in small quantities as early as 1885, commonly under special circumstances or as test shipments. Steady production started in 1951 with shipments of magnetite concentrates to Japan from Vancouver and Texada Islands. Most of the known iron-ore deposits are magnetite, and occur in the coastal area. On average they are low in grade and need to be concentrated. Producing mines have operated on Texada Island, at Benson Lake and Zeballos on Vancouver Island, and at Tasu and Jedway on Morseby Island. At Texada Island copper was a by-product of iron mining, and in the Coast Copper mine at Benson Lake, iron was a by-product of copper mining. The latest operation, and to date the largest, is that of Wesfrob Mines Limited at Tasu, begun at the end of 1967; copper is produced as a by-product.

From January 1961 to August 1972, calcined iron sulphide from the tailings of the Sullivan mine was used for making pig iron at Kimberley. This was the first manufacture of pig iron in British Columbia. The iron occurs as pyrrhotite and pyrite in the lead-zinc ore of the Sullivan mine. In the process of milling, the lead and zinc minerals are separated for shipment to the Trail smelter, and the iron sulphides are separated from the waste rock. Over the years a stockpile has been built containing a reserve of about 18 million tonnes of iron ore. The sulphur was removed in making pig iron and was converted to sulphuric acid, which was used in making fertilizer. A plant built at Kimberley converted the pig iron to steel, and a fabricating plant was acquired in Vancouver. The iron smelter at Kimberley closed in August 1972. The entire production, credited to the Fort Steele Mining Division in Table 3-7C, is of calcine. *See* Tables 3-1, 3-3, 3-6, and 3-7C.

Iron Oxide--Iron oxide, ochre, and bog iron were mined as early as 1918 from several occurrences, but mainly from limonite deposits north of Squamish. None has been produced since 1950. *See* Tables 3-1 and 3-7D.

Jade (Nephrite)--Production of jade (nephrite) has been recorded only since 1959 despite there being several years of significant production prior to that date. The jade is recovered from bedrock occurrences on Mount Ogden and near Dease Lake and as alluvial boulders from the Fraser River; the Bridge River and its tributaries, Marshall, Hell, and Cadwallader Creeks; O'Ne-ell, Ogden, Kwanika, and Wheaton Creeks. *See* Tables 3-1, 3-3, and 3-7D.

Lead--Lead was the most valuable single commodity for many years, but it was surpassed in value of annual production by zinc in 1950, by copper in 1966, by molybdenum in 1969, and in total production by zinc in 1966.

Lead and zinc usually occur together in nature although not necessarily in equal amounts in a single deposit. Zinc is the more abundant metal, but lead ore usually is more valuable than zinc ore because it contains more silver as a by-product. For a long time British Columbia produced almost all of Canada's lead, but now produces about 29 per cent of the total. Most of the concentrated ore was smelted and the metal refined at Trail in 1983.

Almost all of British Columbia's lead comes from the southeastern part of the province. The Sullivan mine at Kimberley is now producing about 90 per cent of the province's lead and has produced about 86 per cent of the grand total. This is one of the largest mines in the world and supports the great metallurgical works at Trail. Other mines are at Pend-d'Oreille River, North Kootenay Lake, Slocan, southwestern British Columbia, and Vancouver Island. In northwestern British Columbia less important parts of the total output have come from Tulsequah, the Premier mine, and several small mines in the general region of Hazelton. *See* Table 3-12 for current lead producers.

A small amount of high-grade lead ore is shipped directly to the smelter, but most of the ore is concentrated by flotation and the zinc content is separated from the lead. Generally all output from the Sullivan goes to the Trail smelter. Lead was first produced in 1887, and the total production amounts to approximately 8.2 million tonnes.

In 1958, revisions were made in some yearly totals for lead to adjust them for recovery of lead from slag treated at the Trail smelter. *See* Tables 3-1, 3-3, 3-6, and 3-7B.

Limestone--Besides being used for flux and granules (where it is recorded separately), limestone is used in agriculture, in cement manufacture, in the pulp and paper industry, and for making lime. It has been produced since 1886. *See* Tables 3-1, 3-3, and 3-7E.

Magnesium--In 1941 and 1942, Cominco Ltd. produced magnesium from magnesite mined from a large deposit at Marysville. *See* Tables 3-1 and 3-7C.

Magnesium Sulphate--Magnesium sulphate was recovered in minor amounts at various times between 1915 and 1942 from small alkali lakes near Basque, Clinton, and Osoyoos. *See* Tables 3-1 and 3-7D.

Manganese--From 1918 to 1920, manganese ore was shipped from a bog deposit near Kaslo and from Hill 60 near Cowichan Lake, and in 1956 a test shipment was made from Olalla. *See* Tables 3-1 and 3-7C.

Mercury--Mercury was first produced near Savona in 1895. Since then small amounts have been recovered from the same area and from the Bridge River district. The main production to date was between 1940 and 1944 from the Pinchi Lake and Takla mines near Fort St. James. In 1968 the Pinchi Lake mine reopened and continued in operation until 1975 when it closed because of market situations. *See* Tables 3-1 and 3-7C.

Mica--No sheet mica has been produced commercially in British Columbia. Between 1932 and 1961, small amounts of mica schist for grinding were mined near Albreda, Armstrong, Oliver, Prince Rupert, and Sicamous. *See* Tables 3-1 and 3-7D.

Molybdenum--Molybdenum ore in small amounts was produced from high-grade deposits between 1914 and 1918. Recently, mining of large low-grade molybdenum and copper-molybdenum deposits has increased production to the point that molybdenum now ranks second in importance in annual value of metals produced in British Columbia. *See* Tables 3-1, 3-3, 3-6, and 3-7C.

Natro-alunite--In 1912 and 1913, 363 tonnes of natro-alunite was mined from a small low-grade deposit at Kyuquot Sound. There has been no subsequent production. *See* Tables 3-1 and 3-7D.

Natural Gas--Commercial production of natural gas began in 1954 to supply the community of Fort St. John. In 1957 the gas plant at Taylor and the pipeline to serve British Columbia and the northwestern United States was completed.

The production shown in Tables 3-1, 3-3, 3-7A, and 3-14, is the total amount sold of residential gas from processing plants plus dry and associated gas from the gas-gathering system; that is, the quantity delivered to the main transmission-line. The quantity is net after deducting gas used on leases, metering difference, and gas used or lost in the cleaning plant. The quantity is reported as millions of cubic metres at standard condition [99.2 kPa (kilopascals) pressure, 15°C temperature, up to and including the year 1960, and thereafter 101.3 kPa pressure, 15°C temperature]. Full details of gross well output, other production, delivery, and sales are given in the tables in the *Summary of Operations, Petroleum Resources Division*.

Nickel--One mine, the Pride of Emory near Hope, shipped nickel ore in 1936 and 1937 and began continuous production in 1958. From 1960 to 1974, bulk copper and nickel concentrates have been shipped to Japan and Alberta respectively for smelting. The mine closed in August 1974. *See* Tables 3-1, 3-3, and 3-7C.

Niobium--Niobium was produced from placer deposits on Vowell and Malloy Creeks in the Bugaboo area in 1956. A test shipment of 8 187 tonnes of gravel was shipped by St. Eugene Mining Corporation Limited to Quebec Metallurgical Industries. The placer contained a variety of minerals, including pyrochlore and uraninite. Recovery from the test shipment was as follows: 104.39 kilograms of niobium and 146.29 kilograms of uranium and thorium.

Palladium--Palladium was recovered in 1928, 1929, and 1930 as a by-product of the Trail refinery and is presumed to have originated in copper concentrates shipped to the smelter from the Copper Mountain mine. *See* Tables 3-1 and 3-7C.

Perlite--In 1953 a test shipment of 1 009 tonnes was made from a quarry on Francois Lake. There has been no further production. *See* Tables 3-1 and 3-7D.

Petroleum, Crude--*See* Crude oil.

Phosphate Rock--Between 1927 and 1933, Cominco Ltd. produced 3 485 tonnes of phosphate rock for test purposes, but the grade proved to be too low for commercial use. More test shipments were made in 1964, but there has been no commercial production. *See* Tables 3-1 and 3-7D.

Platinum--Platinum has been produced intermittently from placer streams in small amounts since 1887, mostly from the Tulameen and Similkameen Rivers. Placer platinum also has been recovered from Pine, Thibert, McConnell, Rainbow, Tranquille, Rock, and Government Creeks; from Quesnel, Fraser, Cottonwood, Peace, and Coquihalla Rivers; and from beach placers on Graham Island. Some platinum recovered between 1928 and 1930 as a by-product at the Trail refinery is presumed to have originated in copper concentrates shipped to the smelter from the Copper Mountain mine. Small amounts were contained in the placer gold in 1979. *See* Tables 3-1, 3-3, and 3-7C.

Propane--Propane is recovered from gas-processing plants at Taylor and Boundary Lake, and at oil refineries. *See* Tables 3-1, 3-3, and 3-7A

Rhenium--Rhenium occurs in significant quantities only with molybdenite associated with porphyry copper deposits. It was first

produced in 1972 by the Island Copper mine and is extracted as rhenium oxide from fumes produced during roasting of the molybdenite concentrate.

Rock--Production of rubble, riprap, and crushed rock has been recorded since 1909. *See* Tables 3-1, 3-3, and 3-7E.

Sand and gravel--Sand and gravel is used as aggregate in concrete work. The output varies from year to year according to the level of activity in the construction industry. *See* Tables 3-1, 3-3, and 3-7E.

Selenium--The only recorded production of selenium, 332 kilograms, was in 1931 from the refining of blister copper from the Anyox smelter. *See* Tables 3-1 and 3-7C.

Silver--Silver is recovered from silver ores or as a by-product of other ores. Most of it is refined in Trail, and some is exported in concentrated ores of copper, lead, and zinc to American and Japanese smelters. Silver bullion was produced by the Torbrit mine from 1949 to 1959.

Some silver is associated with galena, while other is recovered from gold and copper ores, and although the silver in such ores is usually no more than a fraction of an ounce per ton, even that amount is important in a large tonnage operation.

Production of silver began in 1887 from silver-copper and silver-lead ores in the Kootenays and has continued in this area to the present. A considerable amount of the silver is a by-product of lead-zinc ores and nearly all is refined at Trail, although some is exported with concentrates to foreign smelters. By 1983 the Sullivan mine has accounted for 44.7 per cent of the total silver production of the province. In 1983 Equity Silver produced 36.4 per cent of the total silver produced in that year.

Significant amounts are contributed by the Bethlehem, Lynx, Lornex, Island Copper, Afton, Silmonac, and Baker mines. Table 3-12 details current silver production. A former important mine, the Premier near Stewart, produced more than 1.3 million kilograms of silver between 1918 and 1968. *See* Tables 3-1, 3-3, 3-6, and 3-7B.

In 1983, silver totals include 76 981 grams, valued at $35 411, recovered and paid for in placer gold.

Sodium antimonate--In 1983, Equity Silver was the sole producer of sodium antimonate.

Sodium carbonate--Sodium carbonate was recovered between 1921 and 1949 from alkali lakes in the Clinton area and around Kamloops. There has been no further production. *See* Tables 3-1 and 3-7D.

Sodium sulphate--In 1983, Equity Silver was the sole producer of sodium sulphate.

Stone (see Building-stone)--Cut stone for building purposes is prepared from rock produced at quarries in various parts of the province when required. Two of the most productive quarries have operated on Haddington and Nelson Islands. *See* Tables 3-1, 3-3, and 3-7E.

Structural materials--In Table 3-7E the value of $5 972 171 for unclassified materials is the total for structural materials in the period 1886-1919 that cannot be allotted to particular classes of structural materials or assigned to mining divisions, and includes $726 323 shown against 1896 in Table 3-2 that includes unclassified structural materials in that and previous years not assignable to particular years. The figure $3 180 828 in Table 3-7E under "Other Clay Products" is the value in the period 1886-1910 that cannot be allotted to particular clay products or assigned to mining divisions. *See* Tables 3-1, 3-2, 3-3, 3-7A, and 3-7E.

Sulphur--Production of sulphur has been recorded since 1916. From 1916 to 1927 the amounts include the sulphur content of pyrite shipped. From 1928 the amounts include the estimated sulphur content of pyrite shipped, plus the sulphur contained in sulphuric acid made from waste smelter gases. The sulphur content of pyrrhotite roasted at the Kimberley fertilizer plant is included since 1953. Elemental sulphur has been recovered from the Westcoast Transmission Co. Ltd. plant at Taylor since 1958 and the Fort Nelson plant of Petrosul International Ltd. since 1978. *See* Tables 3-1, 3-3, and 3-7D.

Talc--Between 1916 and 1936, talc was quarried at Leech River and at Anderson Lake to make dust for asphalt roofing. There has been no production since 1936. *See* Tables 3-1 and 3-7D.

Thorium--*See* niobium.

Tin--Tin, as cassiterite, is a by-product of the Sullivan mine, where it has been produced since 1941. Tin is also produced in a lead-tin alloy at the Trail smelter. *See* Tables 3-1, 3-3, and 3-7C.

Tungsten--Tungsten, very largely as scheelite concentrates, was produced from 1937 to 1958, first from the Columbia Tungsten's (Hardscrabble) mine in the Cariboo in 1937 and during World War II from the Red Rose mine near Hazelton and the Emerald mine near Salmo. The Red Rose closed in 1954 and the Emerald in 1958. Small amounts of scheelite have been produced from the Bridge River, Revelstoke, and other areas when demand was high. In 1970, production began from the Invincible mine near Salmo; it closed in 1973.

A very small amount of wolframite came from Boulder Creek near Atlin. *See* Tables 3-1, 3-3, and 3-7C.

Uranium--*See* niobium.

Volcanic ash--The only recorded production of volcanic ash is 27 tonnes from the Cariboo Mining Division in 1954. *See* Table 3-7D.

Zinc--Zinc was first produced in 1905. For many years lead was the most valuable single metal, but in 1950 the annual value of production of zinc surpassed that of lead and in 1966 the total value of copper production exceeded that of zinc. In 1977 the production of zinc was exceeded by that of copper, molybdenum, asbestos, coal, crude oil, and natural gas. Zinc is invariably associated with lead. Most ores are mined for their combined values in zinc, lead, and silver, and rarely for their zinc content alone. Some zinc ores contain a valuable amount of gold, and zinc is associated with copper at Lynx mine. Modern practice is to concentrate and separate the zinc mineral (sphalerite) from the lead mineral (galena). Most of the zinc concentrates go to the zinc-recovery plant at Trail, roasted, then converted electronically to refined metal. Usually some concentrates are shipped to American or Japanese smelters.

About 83.7 per cent of the zinc that has been mined in British Columbia has originated in southeastern British Columbia, at the Sullivan mine, and at mines near Ainsworth, Invermere, Moyie Lake, Riondel, Salmo, Slocan, and Spillimacheen. Other production has come from mines at Portland Canal and Tulsequah and is coming from Buttle Lake and Callaghan Creek. The greatest zinc mine is the Sullivan, which has contributed about 71.6 per cent of the total zinc production of the province. *See* Table 3-12 for details of current zinc producers.

Records for the period 1905 to 1908 show shipments totalling 17 096 tonnes of zinc ore and zinc concentrates of unstated zinc content. In 1918, revisions were made to some yearly totals for zinc to adjust them for recovery of zinc from slag treated at the Trail smelter. *See* Tables 3-1, 3-3, 3-6, and 3-7B.

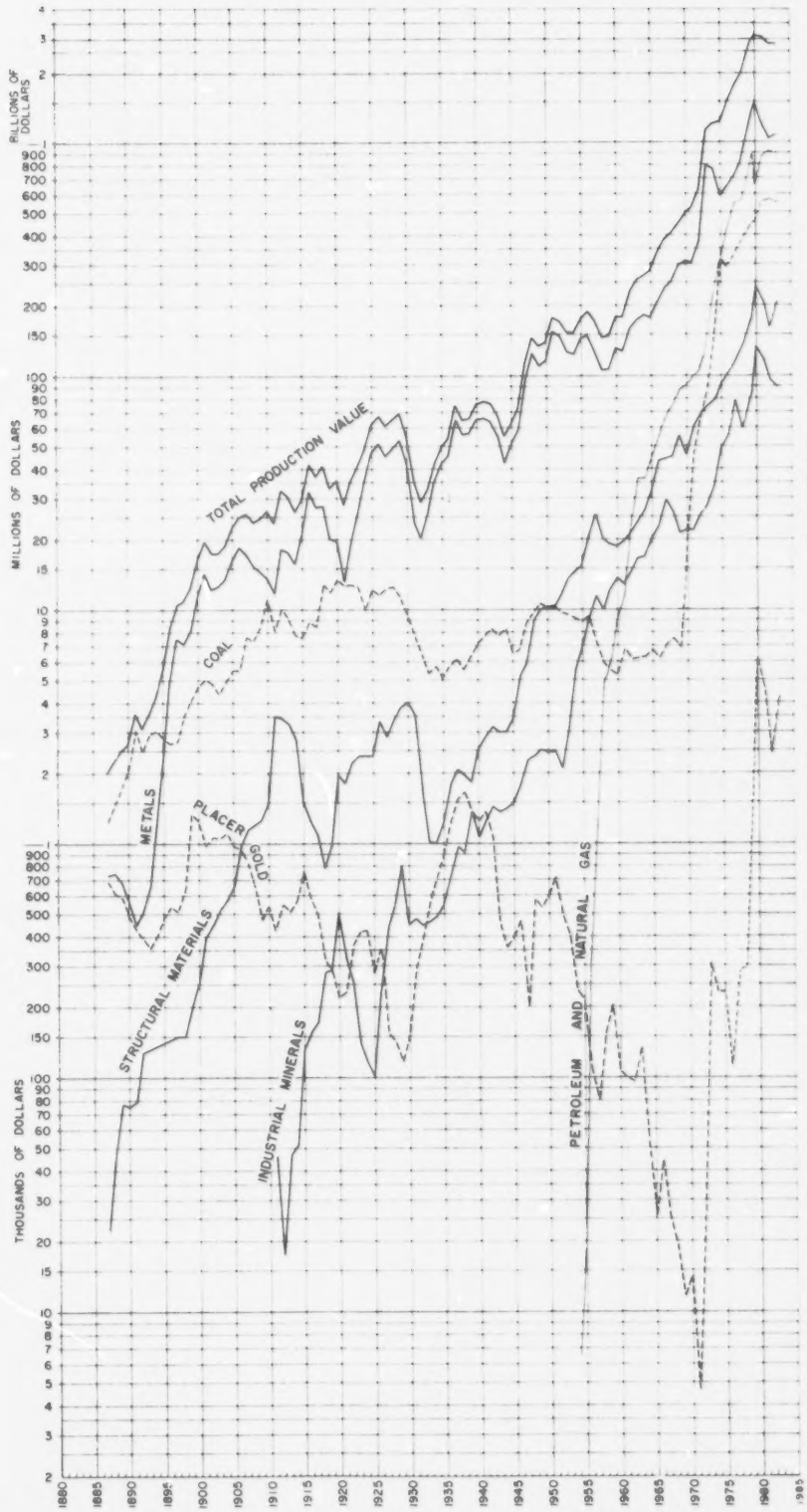

Figure 3-1. Value of Mineral Production, 1887-1983.

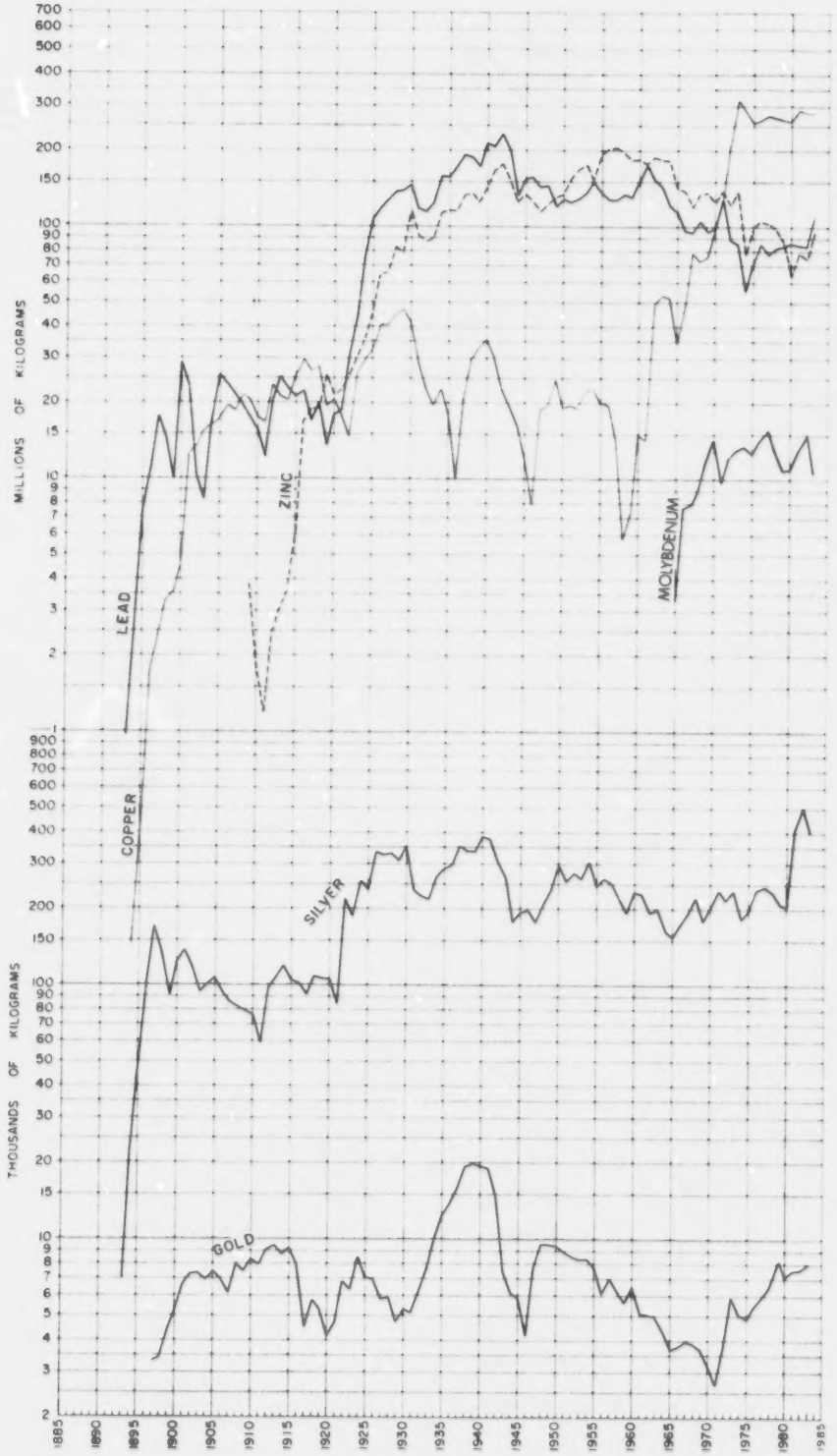

Figure 3-2. Production Quantities of Gold, Silver, Copper, Lead, Zinc, and Molybdenum, 1893-1983.

Prices[1] Used in Valuing Production of Gold, Silver, Copper, Lead, Zinc, and Coal

Year	Gold, Fine	Silver, Fine	Copper	Lead	Zinc	Coal
	$/g	$/g	$/kg	$/kg	$/kg	$/t
1901	0.66457	0.01801 N.Y.	0.355 N.Y.	0.057 N.Y.		2.92
1902	..	.01593 ..	.258 ..	.081 ..		2.90
1903	..	.01633 ..	.292 ..	.084 ..		2.94
1904	..	.01716 ..	.283 ..	.086 ..		2.89
1905	..	.01650 ..	.344 ..	.094 ..		2.98
1906	..	.02040 ..	.425 ..	.106 ..		2.88
1907	..	.01995 ..	.441 ..	.106 ..		3.38
1908	..	.01615 ..	.291 ..	.083 ..		3.43
1909	..	.01573 ..	.286 ..	.085 ..		3.52
1910	..	.01634 ..	.281 ..	.088 ..	0.101 E. St. L.	3.69
1911	..	.01628 ..	.273 ..	.088 ..	.108 ..	3.51
1912	..	.01858 ..	.360 ..	.089 ..	.130 ..	3.70
1913	..	.01826 ..	.337 ..	.087 ..	.106 ..	3.74
1914	..	.01675 ..	.300 ..	.077 ..	.097 ..	3.69
1915	..	.01518 ..	.381 ..	.092 ..	.248 ..	3.78
1916	..	.02006 ..	.600 ..	.136 ..	.240 ..	3.80
1917	..	.02487 ..	.599 ..	.174 ..	.167 ..	3.84
1918	..	.02956 ..	.543 ..	.147 ..	.153 ..	5.50
1919	..	.03394 ..	.412 ..	.114 ..	.138 ..	5.42
1920	..	.03080 ..	.385 ..	.158 ..	.144 ..	5.20
1921	..	.01914 ..	.276 ..	.090 ..	.087 ..	5.30
1922	..	.02062 ..	.295 ..	.114 ..	.107 ..	5.20
1923	..	.01981 ..	.318 ..	.144 ..	.124 ..	5.30
1924	..	.02040 ..	.287 ..	.161 ..	.119 ..	5.39
1925	..	.02221 ..	.310 ..	.173 Lond.	.174 Lond.	5.28
1926	..	.01997 ..	.304 ..	.149 ..	.163 ..	5.34
1927	..	.01812 ..	.285 ..	.116 ..	.137 ..	5.30
1928	..	.01870 ..	.321 ..	.101 ..	.121 ..	5.19
1929	..	.01704 ..	.399 ..	.111 ..	.119 ..	5.22
1930	..	.01227 ..	.286 ..	.087 ..	.079 ..	5.21
1931	..	.00923 ..	.179 ..	.060 ..	.056 ..	4.80
1932	.75459	.01018 ..	.141 Lond.	.047 ..	.053 ..	4.45
1933	.91953	.01216 ..	.164 ..	.053 ..	.071 ..	4.30
1934	1.10922	.01526 ..	.164 ..	.054 ..	.067 ..	4.41
1935	1.13140	.02083 ..	.172 ..	.069 ..	.068 ..	4.35
1936	1.12626	.01451 ..	.209 ..	.086 ..	.073 ..	4.66
1937	1.12497	.01443 ..	.288 ..	.113 ..	.108 ..	4.68
1938	1.13108	.01398 ..	.220 ..	.074 ..	.068 ..	4.42
1939	1.16195	.01302 ..	.223 ..	.070 ..	.068 ..	4.43
1940	1.23782	.01230 ..	.222 ..	.074 ..	.075 ..	4.70
1941	1.23782	.01230 ..	.222 ..	.074 ..	.075 ..	4.57
1942	1.23782	.01324 ..	.222 ..	.074 ..	.075 ..	4.55
1943	1.23782	.01455 ..	.259 ..	.083 ..	.088 ..	4.60
1944	1.23782	.01383 ..	.265 ..	.099 ..	.095 ..	4.68
1945	1.23782	.01511 ..	.277 ..	.110 ..	.142 ..	4.67
1946	1.18156	.02689 ..	.282 ..	.149 ..	.172 ..	5.16
1947	1.12529	.02315 ..	.450 ..	.301 ..	.248 ..	5.64
1948	1.12529	.02411 Mont.	.493 U.S.	.398 ..	.307 ..	6.71
1949	1.15744	.02387 U.S.	.440 ..	.348 U.S.	.292 U.S.	7.18
1950	1.22335	.02593 ..	.517 ..	.319 ..	.332 ..	7.09
1951	1.18477	.03040 ..	.611 ..	.406 ..	.439 ..	7.12
1952	1.10182	.02674 ..	.685 ..	.355 ..	.350 ..	7.65
1953	1.10665	.02693 ..	.669 ..	.292 ..	.235 ..	7.58
1954	1.09539	.02668 ..	.642 ..	.302 ..	.230 ..	7.72
1955	1.10986	.02825 ..	.844 ..	.329 ..	.267 ..	7.43
1956	1.10729	.02873 ..	.877 ..	.347 ..	.293 ..	7.26
1957	1.07867	.02799 ..	.574 ..	.310 ..	.246 ..	7.45
1958	1.09250	.02779 ..	.516 ..	.259 ..	.221 ..	8.21
1959	1.07932	.02812 ..	.611 ..	.257 ..	.242 ..	8.74
1960	1.09153	.02850 ..	.639 ..	.256 ..	.277 ..	7.32
1961	1.14008	.03012 ..	.620 ..	.243 ..	.258 ..	8.16
1962	1.20278	.03730 ..	.672 ..	.227 ..	.274 ..	8.19
1963	1.21371	.04436 ..	.676 ..	.265 ..	.290 ..	8.08
1964	1.21371	.04484 ..	.737 ..	.323 ..	.323 ..	7.65
1965	1.21307	.04481 ..	.846 ..	.380 ..	.345 ..	7.75
1966	1.21242	.04479 ..	1.176 ..	.359 ..	.344 ..	8.02
1967	1.21403	.05373 ..	1.125 ..	.333 ..	.329 ..	8.54
1968	1.21242	.07429 ..	1.195 ..	.321 ..	.312 ..	8.72
1969	1.21178	.06196 ..	1.470 ..	.354 ..	.347 ..	8.82

[1] *See* page 66 for detailed explanation.

Prices[1] Used in Valuing Production of Gold, Silver, Copper, Lead, Zinc, and Coal—Continued

Year	Gold, Fine	Silver, Fine	Copper	Lead	Zinc	Coal
	$/g	$/g	$/kg	$/kg	$/kg	$/t
1970	1.17545	.05946 U.S.	1.294[2]	.360 U.S.	.353 U.S.	8.16
1971	1.13622	.05014 ,,	1.030[2]	.308 ,,	.359 ,,	11.06
1972	1.84934	.05348 ,,	.989[2]	.328 ,,	.388 ,,	12.08
1973	3.13185	.08251 ,,	1.835[2]	.359 ,,	.455 ,,	12.71
1974	5.34868[2]	.15653[2]	1.884[2]	.422[2]	.767[2]	19.93
1975	5.20466[2]	.15560[2]	1.283[2]	.346[2]	.808[2]	35.53
1976	4.03514[2]	.13571[2]	1.438[2]	.384[2]	.615[2]	39.63
1977	5.29972[2]	.15707[2]	1.398[2]	.541[2]	.591[2]	39.04
1978	7.32948[2]	.19832[2]	1.577[2]	.637[2]	.544[2]	40.35
1979	12.58090[2]	.44228[2]	2.412[2]	1.043[2]	.700[2]	41.56
1980	22.77657[2]	.76814[2]	2.534[2]	.862[2]	.732[2]	42.64
1981	17.61233[2]	.37751[2]	2.107233[2]	.725[2]	.846[2]	47.16
1982	15.41585[2]	.31680[2]	1.769[2]	.514[2]	.846[2]	53.25
1983	**16.44946[2]**	**.44832[2]**	**1.964[2]**	**.432[2]**	**.836[2]**	**48.41**

[1] *See* page 66 for detailed explanation.
[2] *See* page 67 for explanation.

CONVERSION TABLE

Metric	Symbol	
Tonnes	t	.90718 = short tons.
Kilograms	kg	.45359 = pounds.
Grams	g	31.103 = troy ounces.
Cubic metres	m^3	× 6.29 = barrels.
Thousand cubic metres	10^3m^3	× 35.49373 = thousand standard cubic feet.

Table 3-1—Mineral Production: Total to Date, Past Year, and Latest Year

Products[1]	Total Quantity to Date	Total Value to Date	Quantity, 1982	Value, 1982	Quantity, 1983	Value, 1983
Metals		$		$		$
Antimony kg	27 930 980	31 610 787	213 519	1 161 543	263 724	1 432 021
Bismuth kg	3 440 593	16 710 625	27 305	83 007	47 427	215 319
Cadmium kg	21 201 830	90 049 595	147 656	286 265	138 171	423 843
Chromite t	722	32 295				
Cobalt kg	114 484	376 661				
Copper kg	5 337 112 791	7 098 494 399	279 873 599	495 009 799	282 864 697	561 111 733
Gold—						
placer g	164 430 008	118 653 135	175 607	2 467 470	287 783	4 317 204
lode, fine g	607 407 117	1 324 118 184	7 511 908	115 802 480	7 693 571	126 555 114
Iron concentrates t	36 299 129	416 868 137	774 951	19 630 010	496 873	13 078 465
Lead kg	8 278 636 869	1 924 102 835	83 746 551	43 035 587	112 941 984	48 778 436
Magnesium kg	92 819	88 184				
Manganese t	1 564	32 668				
Mercury kg	6 094 387	49 218 263				
Molybdenum kg	220 584 997	1 923 321 380	14 747 888	154 990 970	10 778 825	87 584 823
Nickel kg	23 337 783	51 698 754				
Palladium g	23 296	30 462				
Platinum g	44 042	138 801				
Selenium kg	332	1 389				
Silver g	18 594 251 570	1 313 042 332	499 565 577	158 260 320	402 325 338	180 372 129
Tin kg	10 201 052	37 353 449	115 261	1 568 666	136 347	1 985 213
Tungsten (WO_3) kg	9 194 732	49 182 366	104 730	1 114 350		
Zinc kg	7 827 781 784	2 189 859 222	75 182 699	63 571 545	95 286 818	79 634 214
Others		42 495 221		506 368		527 348
Totals		16 677 479 144		1 057 488 380		1 106 015 862
Industrial Minerals						
Arsenious oxide kg	9 987 789	273 201				
Asbestos t	1 952 140	796 384 463	76 084	57 032 422	81 653	53 395 853
Bentonite t	718	16 858				
Diatomite t	35 844	1 351 057	137	6 850	1 955	158 260
Fluorspar t	47 180	795 950				
Fluxes t	4 137 431	11 323 176	53 801	1 018 576	54 076	1 166 314
Granules t	760 205	21 327 415	20 962	1 400 812	51 919	1 [illegible]56 863
Gypsum and gypsite t	10 549 389	55 984 651	415 458	5 468 093	459 815	4 917 144
Hydromagnesite t	2 044	27 536				
Iron oxide and ochre t	16 427	155 050				
Jade kg	2 822 071	9 422 984	78 681	320 861	96 268	577 172
Magnesite t	54 764	999 191			51 960	999 191
Magnesium sulphate t	12 603	254 352				
Mica kg	5 815 954	185 818				
Natro-alunite t	473	9 398				
Perlite t	1 009	11 120			1 000	– (3)
Phosphate rock t	3 485	16 894				
Pumice t	741	21 507	139	3 447	602	18 060
Sodium antimonate t	1 101	569 079	70	45 748	1 031	523 331
Sodium carbonate t	9 518	118 983				
Sodium sulphate t	3 637	303 390	44	3 668	3 593	299 722
Sulphur t	10 850 591	245 443 025	423 892	29 115 860	483 733	24 862 954
Talc t	1 638	34 871				
Volcanic ash t	27	300				
Others		20 692 851		1 227 881		1 521 570
Totals		1 165 723 120		95 644 218		89 496 434
Structural Materials						
Cement t	24 297 621	875 503 038	749 571	69 265 713	853 064	71 080 982
Clay products		171 537 294		5 853 261		7 335 946
Lime and limestone t		141 068 924	2 575 441	10 465 577	2 711 559	12 126 785
Rubble, rip-rap, crushed rock t		178 256 374	2 652 976	12 898 647	3 371 759	17 910 535
Sand and gravel t		1 013 699 658	26 702 329	65 648 899	39 560 774	99 919 233
Building stone t		9 445 069	145	24 547	181	28 047
Not assigned		5 972 171				
Totals		2 395 482 528		164 156 644		208 401 528
Coal						
Coal—sold and used t	245 535 620	4 894 934 723	10 645 742	566 878 240	11 480 298	555 789 196
Totals—Solid Minerals		25 133 619 515		1 884 167 482		1 959 703 020
Petroleum and Natural Gas						
Crude oil m^3	58 671 828	2 471 179 581	2 078 258	333 892 930	2 078 771	402 075 887
Field condensate m^3	354 364	23 400 306	20 771	3 337 069	17 636	3 411 155
Plant condensate m^3	3 796 027	119 491 344	135 185	19 765 399	113 984	20 225 321
Natural gas to pipeline 10^3m^3	168 153 699	4 676 317 642	7 188 561	542 664 470	6 899 911	455 187 128
Butane m^3	2 002 267	66 609 474	89 443	9 436 236	80 291	12 897 946
Propane m^3	1 579 134	40 215 686	68 783	3 806 451	62 494	5 553 842
Totals		7 397 214 033		912 902 555		899 351 279
Grand Totals		32 530 833 548		2 797 070 037		2 859 054 299

[1] *See* notes on individual products listed alphabetically on pages 69 to 82.

[2] *See* page 86 for conversion table to old system.

[3] Test shipment — no value.

Table 3-2—Total Value of Mineral Production, 1836–1983

Year	Metals	Industrial Minerals	Structural Materials	Coal	Petroleum and Natural Gas	Total
	$	$	$	$	$	$
1836–86	52 880 750		43 650	10 758 565		63 610 965
1887	729 381		22 168	1 240 080		1 991 629
1888	745 794		46 432	1 467 903		2 260 129
1889	685 512		77 517	1 739 490		2 502 519
1890	572 884		75 201	2 034 420		2 682 505
1891	447 136		79 475	3 087 291		3 613 902
1892	511 075		129 234	2 479 005		3 119 314
1893	659 969			2 934 882		3 594 851
1894	1 191 728			3 038 859		4 230 587
1895	2 834 629			2 824 687		5 659 316
1896	4 973 769		726 323	2 693 961		8 394 053
1897	7 575 262		150 000	2 734 522		10 459 784
1898	7 176 870		150 000	3 582 595		10 909 465
1899	8 107 509		200 000	4 126 830		12 434 312
1900	11 360 546		250 000	4 744 530		16 355 076
1901	14 258 455		400 000	5 016 398		19 674 853
1902	12 163 561		450 000	4 832 257		17 445 818
1903	12 640 083		525 000	4 332 297		17 497 380
1904	13 424 755	2 400	575 000	4 953 024		18 955 179
1905	16 289 165		660 800	5 511 861		22 461 826
1906	18 449 602		982 900	5 548 044		24 980 546
1907	17 101 305		1 149 400	7 637 713		25 888 418
1908	15 277 991		1 200 000	7 356 866		23 784 857
1909	14 668 141		1 270 559	8 574 884		24 513 584
1910	13 768 731		1 500 000	11 108 335		26 377 066
1911	11 880 062	46 345	3 500 917	8 071 747		23 499 071
1912	18 218 266	17 500	3 436 222	10 786 812		32 458 800
1913	17 701 432	46 446	3 249 605	9 107 460		30 194 943
1914	15 790 727	51 810	2 794 107	7 745 847		26 382 491
1915	20 765 212	133 114	1 509 235	7 114 178		29 521 739
1916	32 092 648	150 718	1 247 912	8 900 675		42 391 953
1917	27 299 934	174 107	1 097 900	8 484 343		37 056 284
1918	27 957 302	281 131	783 280	12 833 994		41 855 707
1919	20 058 217	289 426	980 790	11 975 671		33 304 104
1920	19 687 532	508 601	1 962 824	13 450 169		35 609 126
1921	13 160 417	330 503	1 808 392	12 836 013		28 135 325
1922	19 605 401	251 922	2 469 967	12 880 060		35 207 350
1923	25 769 215	140 409	2 742 388	12 678 548		41 330 560
1924	35 959 566	116 932	2 764 013	9 911 935		48 752 446
1925	46 480 742	101 319	2 766 838	12 168 905		61 517 804
1926	51 867 792	223 748	3 335 885	11 650 180		67 077 605
1927	45 134 289	437 729	2 879 160	12 269 135		60 720 313
1928	48 640 158	544 192	3 409 142	12 633 510		65 227 002
1929	52 805 345	807 502	3 820 732	11 256 260		68 689 839
1930	41 785 380	457 225	4 085 105	9 435 650		55 763 360
1931	23 530 469	480 319	3 538 519	7 684 155		35 233 462
1932	20 129 869	447 495	1 705 708	6 523 644		28 806 716
1933	25 777 723	460 683	1 025 586	5 375 171		32 639 163
1934	35 177 224	486 554	1 018 719	5 725 133		42 407 630
1935	42 006 618	543 583	1 238 718	5 048 864		48 837 783
1936	45 889 944	724 362	1 796 677	5 722 502		54 133 485
1937	65 224 245	976 171	2 098 339	6 139 920		74 438 675
1938	55 959 713	916 841	1 974 976	5 565 069		64 416 599
1939	56 216 049	1 381 720	1 832 464	6 280 956		65 711 189
1940	64 332 166	1 073 023	2 534 840	7 088 265		75 028 294
1941	68 807 630	1 253 561	2 845 262	7 660 000		77 566 453
1942	63 626 140	1 434 382	3 173 635	8 237 172		76 471 329
1943	55 005 394	1 378 337	3 025 255	7 742 030		67 151 016
1944	42 095 013	1 419 248	3 010 088	8 217 966		54 742 315
1945	50 673 592	1 497 720	3 401 229	6 454 360		62 026 901
1946	58 834 747	1 783 010	5 199 563	6 732 470		72 549 790
1947	95 729 867	2 275 972	5 896 803	8 680 440		112 583 082
1948	124 091 753	2 358 877	8 968 222	9 765 395		145 184 247
1949	110 219 917	2 500 799	9 955 790	10 549 924		133 226 430
1950	117 166 836	2 462 340	10 246 939	10 119 303		139 995 418

Table 3-2—Total Value of Mineral Production, 1836–1983—Continued

Year	Metals	Industrial Minerals	Structural Materials	Coal	Petroleum and Natural Gas	Total
	$	$	$	$	$	$
1951	153 598 411	2 493 840	10 606 048	10 169 617	.....	176 867 916
1952	147 857 523	2 181 464	11 596 961	9 729 739	.....	171 365 687
1953	126 755 705	3 002 673	13 555 038	9 528 279	.....	152 841 695
1954	123 834 286	5 504 114	14 395 174	9 154 544	6 545	152 894 663
1955	142 609 505	6 939 490	15 299 254	8 986 501	18 610	173 853 360
1956	149 441 246	9 172 792	20 883 631	9 346 518	319 465	189 163 652
1957	125 353 920	11 474 050	25 626 939	7 340 339	1 197 581	170 992 829
1958	104 251 112	9 958 768	19 999 576	5 937 860	4 806 233	144 953 549
1959	105 076 530	12 110 286	19 025 209	5 472 064	5 967 128	147 651 217
1960	130 304 373	13 762 102	18 829 989	5 242 223	9 226 646	177 365 333
1961	128 565 774	12 948 308	19 878 921	6 802 134	11 612 184	179 807 321
1962	159 627 293	14 304 214	21 366 265	6 133 986	27 939 726	229 371 484
1963	172 852 866	16 510 898	23 882 190	6 237 997	36 379 636	255 863 587
1964	180 926 329	16 989 469	26 428 939	6 327 678	36 466 753	267 139 168
1965	177 101 733	20 409 649	32 325 714	6 713 590	44 101 662	280 652 348
1966	208 664 003	22 865 324	43 780 272	6 196 219	54 274 187	335 780 005
1967	235 865 318	29 364 065	44 011 488	7 045 341	67 096 286	383 382 498
1968	250 912 026	26 056 782	45 189 476	7 588 989	75 281 215	405 028 488
1969	294 881 114	20 492 943	55 441 528	6 817 155	86 756 009	464 388 749
1970	309 981 470	22 020 359	46 104 071	19 559 669	90 974 467	488 640 036
1971	301 059 951	21 909 767	59 940 333	45 801 936	99 251 158	527 953 145
1972	372 032 770	25 764 120	66 745 698	66 030 210	105 644 978	636 217 776
1973	795 617 596	27 969 664	73 720 831	87 976 105	124 104 445	1 109 388 641
1974	764 599 451	33 676 214	78 088 393	154 593 643	233 275 505	1 264 233 206
1975	586 650 344	48 667 602	90 928 011	317 111 744	320 719 474	1 364 077 175
1976	646 750 403	52 917 142	100 938 648	298 683 679	420 973 564	1 520 263 436
1977	714 036 707	79 185 099	115 650 992	328 846 883	550 439 856	1 788 159 537
1978	819 778 518	59 471 361	142 105 285	381 895 241	568 931 051	1 972 181 456
1979	1 350 776 761	83 100 984	187 671 941	439 280 152	896 377 125	2 957 206 963
1980	1 429 002 180	115 926 007	242 325 657	461 492 857	828 302 626	3 077 049 327
1981	1 246 682 535	122 464 842	200 786 279	554 271 292	884 516 084	3 008 721 032
1982	1 057 488 380	95 644 218	164 156 644	566 878 240	912 902 555	2 797 070 037
1983	1 106 015 862	89 496 434	208 401 528	555 789 196	899 351 279	2 859 054 299
Totals	16 677 479 144	1 165 723 120	2 395 482 528	4 894 934 723	7 397 214 033	32 530 833 548

Table 3-3—Mineral Production for the 10 Years, 1974–1983

Description		1974		1975		1976		1977		1978	
		Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Metals			$		$		$		$		$
Antimony	kg	221 238	879 897	364 045	1 467 928	447 001	1 636 871	596 207	2 519 739	459 521	2 083 895
Bismuth	kg	33 711	680 771	19 163	261 931	20 261	226 462	18 540	187 612	28 172	166 452
Cadmium	kg	195 979	1 532 096	320 923	1 971 035	356 422	1 530 800	320 711	1 720 051	253 803	1 186 320
Copper	kg	287 547 048	541 644 913	258 497 599	331 693 850	263 618 197	378 984 941	275 224 115	384 736 661	273 692 676	431 694 395
Gold—placer	g	45 162	232 512	43 744	232 204	26 064	115 613	46 170	289 075	36 515	295 001
lode, fine	g	5 001 082	26 749 083	4 819 241	25 082 494	5 393 477	21 761 502	5 906 336	31 301 931	6 542 332	47 951 880
Iron concentrates	t	1 306 930	12 742 227	1 305 840	15 273 878	1 255 277	14 760 526	445 317	7 362 345	615 569	11 597 462
Lead	kg	55 252 692	23 333 016	70 603 483	24 450 158	85 407 582	32 796 533	78 172 646	42 316 293	81 064 539	51 640 564
Molybdenum	kg	13 789 825	60 791 552	13 026 627	71 201 391	14 088 686	94 109 138	15 521 970	142 057 947	13 055 203	167 714 272
Nickel	kg	688 656	2 351 406								
Silver	g	181 695 950	28 440 365	196 305 885	30 545 947	239 720 882	32 532 836	241 503 007	37 934 098	227 271 890	45 071 509
Tin	kg	143 816	1 150 722	32 511	200 669	102 262	712 912	187 478	1 912 300	261 863	3 675 508
Tungsten (WO_3)	kg										
Zinc	kg	77 733 732	59 582 753	99 668 230	80 572 872	106 498 987	65 499 108	103 780 228	61 301 001	95 618 111	52 048 701
Others			4 488 138		3 695 987		2 083 161		397 654		4 652 559
Subtotals			764 599 451		586 650 344		646 750 403		714 036 707		819 778 518
Industrial Minerals											
Asbestos	t	83 403	27 398 900	76 771	37 849 743	90 443	40 727 296	97 033	69 729 205	68 266	47 066 170
Diatomite	t	1 593	32 600	5 847	229 483	2 737	182 159	1 239	49 595	2 184	59 346
Fluxes (quartz, limestone)	t	34 451	206 049	35 914	174 824	11 378	33 263	28 624	95 461	22 475	56 894
Granules (quartz, limestone, granite)	t	31 546	1 025 615	33 316	1 144 968	31 476	1 219 884	29 551	1 238 485	26 849	1 186 160
Gypsum and gypsite	t	400 338	1 412 157	474 387	1 751 799	556 134	4 434 471	653 126	2 357 488	733 080	3 110 695
Jade	kg	3 510	18 613	110 437	414 123	483 796	1 535 030	266 621	825 523	488 759	1 422 018
Sulphur	t	206 646	3 068 507	246 079	5 738 134	231 704	4 296 189	248 892	3 871 660	322 181	5 647 993
Others			513 773		1 364 528		488 850		1 017 682		922 085
Subtotals			33 676 214		48 667 602		52 917 142		79 185 099		59 471 361
Structural Materials											
Cement	t	890 372	25 828 823	915 293	31 681 722	846 548	34 973 746	909 522	42 705 320	1 020 065	56 140 564
Clay products			6 615 128		6 593 189		6 955 917		4 909 799		6 282 560
Lime and limestone	t	2 097 909	4 297 547	1 976 415	4 349 800	2 173 831	5 610 063	2 231 166	5 861 614	2 512 867	6 929 484
Rubble, riprap, and crushed rock	t	2 691 473	5 715 219	4 103 452	8 723 448	2 485 215	5 205 973	2 464 503	7 309 536	2 841 920	8 410 065
Sand and gravel	t	31 440 908	35 611 346	28 945 523	39 575 457	36 073 618	48 138 635	53 994 528	54 809 121	38 353 326	64 324 582
Building-stone	t	452	20 330	53	4 395	657	14 314	4 535	55 602	405	18 030
Subtotals			78 088 393		90 928 011		100 938 648		115 650 992		142 105 285
Coal											
Sold and used	t	7 757 440	154 593 643	8 924 816	317 111 744	7 537 695	298 683 679	8 424 181	328 846 883	9 463 920	381 895 241
Total solid minerals			1 030 957 701		1 043 357 701		1 099 289 872		1 237 719 681		1 403 250 405
Petroleum and Natural Gas											
Crude oil	m^3	3 012 501	103 335 328	2 269 898	94 229 725	2 367 450	116 595 050	2 200 303	132 859 085	2 004 699	145 005 524
Field condensate	m^3	16 561	568 075	16 094	668 092	18 309	901 711	24 465	1 477 248	25 386	1 836 217
Plant condensate	m^3	178 534	924 549	185 272	6 525 837	167 576	7 198 957	180 267	9 751 058	155 503	10 269 861
Natural gas delivered to pipeline	10^3m^3	9 016 996	128 018 726	9 236 489	214 733 528	8 799 508	287 997 059	8 895 663	396 601 354	8 003 029	401 373 236
Butane	m^3	105 426	232 085	106 427	2 577 205	109 781	4 591 832	111 357	5 358 167	106 580	5 932 766
Propane	m^3	89 373	196 742	81 975	1 985 087	88 195	3 688 955	91 297	4 392 944	85 732	4 513 447
Total petroleum and natural gas			233 275 505		320 719 474		420 973 564		550 439 856		568 931 051
Grand totals			1 264 233 206		1 364 077 175		1 520 263 436		1 788 159 537		1 972 181 456

Table 3-3—Mineral Production for the 10 Years, 1974–1983—Continued

Description	1979		1980		1981		1982		1983	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Metals		$		$		$		$		$
Antimony kg	177 046	916 081	78 654	416 080	68 323	360 745	213 519	1 161 543	263 724	1 432 021
Bismuth kg	33 809	173 667	23 501	136 306	47 300	102 641	27 305	83 007	47 427	215 319
Cadmium kg	239 096	1 417 506	92 360	560 679	101 962	371 077	147 656	286 265	138 171	423 843
Copper kg	272 163 001	656 359 923	264 674 830	670 623 616	290 088 241	611 282 050	279 873 599	495 009 799	282 864 697	561 111 733
Gold—placer g	214 106	2 649 918	280 104	6 213 376	291 705	4 540 289	175 607	2 467 470	287 783	4 317 204
lode, fine g	8 062 810	101 481 156	7 197 312	163 930 073	7 468 769	131 542 422	7 511 908	115 802 480	7 693 571	126 555 114
Iron concentrates t	668 026	13 008 475	653 324	13 670 233	602 272	14 274 498	774 951	19 630 010	496 823	13 078 465
Lead kg	84 451 905	88 100 363	76 709 447	66 096 223	84 854 093	61 529 276	83 746 551	43 035 587	112 941 984	48 778 436
Molybdenum kg	10 766 497	321 228 104	11 209 501	288 934 398	12 933 244	198 240 391	14 747 888	154 990 970	10 778 825	87 584 823
Platinum g	280	3 793								
Silver g	214 117 518	94 700 656	203 801 811	156 548 306	403 754 797	152 420 716	499 565 577	158 260 320	402 325 338	180 372 129
Tin kg	240 984	3 818 948	139 517	2 438 881	150 341	2 198 138	115 261	1 568 666	136 347	1 985 213
Tungsten (WO_3) kg							104 730	1 114 350		
Zinc kg	88 418 642	61 890 891	67 481 328	49 363 417	79 214 552	67 026 535	75 182 699	63 571 545	95 286 818	79 634 214
Others		5 027 280		10 070 592		2 793 757		506 368		527 348
Subtotals		1 350 776 761		1 429 002 180		1 246 682 535		1 057 488 380		1 106 015 862
Industrial Minerals										
Asbestos t	94 286	65 520 069	100 089	81 688 936	90 914	76 770 285	76 084	57 032 422	81 653	53 395 853
Diatomite t	1 452	33 025	3 615	138 273	3 600	155 232	137	6 850	1 955	158 260
Fluxes (quartz, limestone) t	27 741	129 035	43 986	93 135	48 313	509 678	53 801	1 018 576	54 076	1 166 314
Granules (quartz, limestone, granite) t	30 074	1 458 987	31 393	1 694 947	28 297	1 756 810	20 962	1 400 812	51 919	1 056 863
Gypsum *and* gypsite t	718 557	3 782 628	751 067	5 387 949	684 924	5 804 770	415 458	5 468 093	459 815	4 917 144
Jade kg	258 505	1 325 777	449 156	1 580 241	59 208	133 598	78 681	320 861	96 268	577 172
Sulphur t	383 724	9 616 390	359 413	21 712 359	507 566	33 337 562	423 892	29 115 860	483 733	24 862 954
Others		1 235 073		3 630 167		3 996 907		1 280 744		3 361 874
Subtotals		83 100 984		115 926 007		122 464 842		95 644 218		89 496 434
Structural Materials										
Cement t	1 550 596	89 185 273	1 351 320	90 881 086	955 922	82 372 375	749 571	69 265 713	853 064	71 080 982
Clay products		11 744 194		10 387 121		10 292 772		5 853 261		7 335 946
Lime and limestone t	2 880 138	8 037 476	3 129 762	9 945 044	2 659 406	9 400 205	2 575 441	10 465 577	2 711 559	12 126 785
Rubble, riprap, and crushed rock t	2 488 389	6 766 665	7 019 167	32 436 456	3 168 694	11 100 383	2 652 976	12 898 647	3 371 759	17 910 535
Sand and gravel t	46 241 983	71 918 633	45 278 202	98 666 100	42 361 930	87 603 864	26 702 329	65 648 899	39 560 774	99 919 233
Building-stone t	2 194	19 700	91	9 850	383	11 875	145	24 547	181	28 047
Subtotals		187 671 941		242 325 657		200 786 479		164 156 644		208 401 528
Coal										
Sold and used t	10 570 370	439 280 152	10 823 530	461 492 857	11 752 621	554 271 292	10 645 742	566 878 240	11 480 298	555 789 196
Total solid minerals		2 060 829 838		2 248 746 701		2 124 205 148		1 884 167 482		1 959 703 020
Petroleum and Natural Gas										
Crude oil m^3	2 139 963	168 928 671	2 002 128	189 561 479	2 035 953	236 170 548	2 078 258	333 892 930	2 078 771	402 075 887
Field condensate m^3	32 549	2 569 418	36 885	3 489 431	27 871	3 233 036	20 771	3 337 069	17 636	3 411 155
Plant condensate m^3	184 398	13 396 500	133 601	11 641 991	124 946	13 284 259	135 185	19 765 399	113 984	20 225 321
Natural gas delivered to pipeline 10^3m^3	11 392 641	699 508 127	8 931 833	612 545 107	8 062 681	616 795 096	7 188 561	542 664 470	6 899 911	455 187 128
Butane m^3	112 683	7 122 711	89 556	6 491 914	84 635	9 953 076	89 443	9 436 236	80 291	12 897 946
Propane m^3	84 864	4 851 698	75 507	4 572 704	64 118	5 080 069	68 783	3 806 451	62 494	5 553 842
Total petroleum and natural gas		896 377 125		828 302 626		884 516 084		912 902 555		899 351 279
Grand totals		2 957 206 963		3 077 049 327		3 008 721 232		2 797 070 037		2 859 054 299

Table 3-4—Comparison of Total Quantity and Value of Production, and Quantity and Value of Production Paid for to Mines

Metals	Units	1983 Total Production		1983 Production Paid for to Mines	
		Quantity	Value	Quantity	Value
			$		$
Antimony	kg	263 724	1 432 021		
Bismuth	kg	47 427	215 319		
Cadmium	kg	138 171	423 843	16 101	21 822
Copper	kg	282 864 697	561 111 733	282 677 075	809 173 819
Gold—placer	g	287 783	4 317 204	287 783	4 317 204
Gold—lode, fine	g	7 693 571	126 555 114	7 589 629	103 909 073
Iron concentrates	t	496 823	13 078 465	496 823	13 078 465
Lead	kg	112 941 984	48 778 436	105 352 693	31 287 037
Molybdenum	kg	10 778 825	87 584 823	10 778 825	87 584 823
Silver	g	402 325 358	180 372 129	393 386 844	121 876 279
Tin	kg	136 347	1 985 213	136 347	1 934 197
Zinc	kg	95 286 818	79 634 214	69 080 348	40 703 417
Others			527 348		527 348
Totals			1 106 015 862		814 413 484

Note: For metals, the total quantity and value of production include the quantities paid for to the mines, and the smelter and refining production that can be attributed to the mines but is not paid for. The quantity and value paid for to the mines, excluding outward transportation costs, smelting and refining costs, penalties and deductions, are shown separately for comparative purposes.

Table 3-5—Exploration and Development Expenditures, 1974–1983

	Physical Work and Surveys	Administration, Overhead, Land Costs, Etc	Construction, Machinery and Equipment, Other Capital Costs	Totals
A. Exploration on Undeclared Mines	$	$	$	$
Metal mines—				
1974	18 773 326	6 525 878	128 144	25 427 348
1975	16 366 152	5 298 367	442 327	22 106 846
1976	20 437 180	6 365 331	381 416	27 183 927
1977	19 087 099	6 974 231	106 059	26 177 389
1978	22 724 774	5 715 214	1 035 353	29 475 341
1979	42 789 552	10 438 163	583 114	53 810 829
1980	74 378 109	14 367 266	4 107 339	92 852 714
1981	88 938 669	19 060 910	10 976 496	118 946 075
1982	30 868 724	11 063 588	422 868	42 355 180
1983	43 176 309	16 611 376	1 086 445	60 764 130
Coal mines—				
1974	3 450 746	884 849	18 958	4 354 553
1975	9 955 507	3 057 843		13 013 350
1976	9 234 269	3 678 893		12 913 162
1977	14 741 425	4 797 788		19 539 213
1978	15 289 351	4 511 572		19 800 923
1979	11 765 168	6 073 861		17 839 029
1980	9 830 425	5 703 387		15 533 812
1981	25 557 948	9 866 432	1 932	35 426 312
1982	7 596 523	4 194 832		11 791 355
1983	7 213 243	5 913 855		13 127 098
Others—				
1974	42 706	11 134		53 840
1975	90 025	35 679		125 704
1976	73 453	47 760		121 213
1977	327 113	9 863	222 092	559 065
1978	342 100	117 180		459 280
1979	135 062	149 131		284 193
1980	1 340 398	189 292		1 529 690
1981	808 742	30 870	367 106	1 206 718
1982	980 203	150 720		1 130 923
1983	1 225 129	773 100	80 000	2 078 229
Totals—				
1974	22 266 778	7 421 861	147 102	29 835 741
1975	26 411 684	8 391 889	442 327	35 245 900
1976	29 744 902	10 091 984	381 416	40 218 302
1977	34 165 637	11 781 879	328 151	46 275 667
1978	38 356 225	10 343 966	1 035 353	49 735 544
1979	54 689 782	16 661 155	583 114	71 934 051
1980	85 548 932	20 259 945	4 107 339	109 916 216
1981	115 275 359	28 958 212	11 345 534	155 579 105
1982	39 445 450	15 409 140	422 868	55 277 458
1983	51 614 741	23 298 331	1 086 445	75 999 517
B. Exploration on Declared or Operating Mines				
Metal mines—				
1974	2 652 243	762 224	278 500	3 692 967
1975	2 792 378	3 080 135		5 882 513
1976	8 354 413	83 304		8 442 717
1977	2 988 366	2 020 259		5 008 625
1978	6 562 912	1 729 402		8 292 314
1979	6 946 143	1 585 176	263 586	8 794 905
1980	26 712 536	4 345 682	2 551 716	33 609 934
1981	7 559 289	466 704	8 000	8 033 993
1982	4 508 057	7 947 145		12 455 202
1983	2 586 725	919 409	351 155	3 857 289
Coal mines—				
1974	488 308	104 259		592 567
1975	1 000 000			1 000 000
1976	665 000	28 000		693 000
1977	5 978 043	25 115 000		31 093 043
1978	4 052 774	510 612		4 563 386
1979	3 376 551	398 984		3 775 535
1980	12 504 905	8 510 426		21 015 331
1981	6 008 376	348 780		6 357 156
1982	11 408 367	2 710 714		14 119 081
1983	10 019 044	1 067 005		11 086 049

Table 3-5—Exploration and Development Expenditures, 1974–1983—Continued

	Physical Work and Surveys	Administration, Overhead, Land Costs, Etc.	Construction, Machinery and Equipment, Other Capital Costs	Totals
B. Exploration on Declared or Operating Mines—Continued				
Others—				
1974	4 236			4 236
1975	36 242	2 700		38 942
1976	214 081	30 000		244 081
1977	108 890	403 300		510 190
1978	12 025			12 025
1979	55 200		1 300	56 500
1980	187 332			187 332
1981	60 300	7 150		67 450
1982	36 900	9 300		46 200
1983	666 507	13 000		679 507
Totals—				
1974	5 144 787	866 485	278 500	6 289 770
1975	5 828 630	1 092 825		6 921 455
1976	4 238 494	141 304		9 379 798
1977	9 015 305	27 536 559		36 611 864
1978	10 627 713	2 240 014		12 867 735
1979	10 353 804	1 986 160	264 886	12 604 850
1980	39 464 771	12 856 108	2 551 716	54 812 595
1981	13 627 965	822 834	8 000	14 458 799
1982	15 953 534	10 667 159		26 620 693
1983	15 272 276	1 999 414	151 155	17 422 845
C. Development on Declared Mines				
Metal mines—				
1974	1 280 515	1 028 199	1 985 000	4 293 712
1975		57 166	840 344	897 510
1976	512 197	974 085	12 447 569	13 934 751
1977	380 419	1 532 331	33 672 153	35 584 888
1978	133 335	895 892		1 029 227
1979	1 482 967	1 351 567	54 550 268	56 985 733
1980	83 119 989	736 527	23 446 243	107 302 759
1981	10 072 107	6 888 019	29 995 101	55 955 227
1982	11 022 201	425 555	4 577 981	16 025 737
1983	91 500	449 460		540 960
Coal mines—				
1974	330 000	256 055	111 500	697 655
1975				
1976	1 425 317	585 936		2 011 253
1977	1 725 484	247 513		1 972 997
1978	93 957	58 910		152 867
1979	981 517	150 157		1 131 674
1980	5 790 000	600 000	43 750 261	50 040 261
1981	7 812 356	1 771 353	115 229 391	124 813 100
1982	123 078 469	541 915		123 620 384
1983				
Others—				
1974	71 242	17 000	2 885 584	2 944 814
1975				
1976		3 155	18 031 500	18 034 655
1977	64 689	708	40 000	105 397
1978	7 065	2 159	101 000	110 224
1979				
1980				
1981				
1982				
1983	1 500	2 500		4 000
Totals—				
1974	1 623 853	1 322 242	4 980 084	7 926 179
1975		57 166	840 344	897 510
1976	1 937 509	1 561 444	30 449 069	33 948 022
1977	2 170 592	1 980 337	15 712 153	17 263 082
1978	171 337	956 961	101 000	1 229 298
1979	4 464 479	1 731 724	54 550 268	60 725 467
1980	89 415 989	8 035 527	66 726 504	153 968 020
1981	26 884 466	8 659 356	145 232 492	180 766 297
1982	134 100 670	767 470	4 577 981	139 446 121
1983	93 000	451 960		545 160
D. Development on Operating Mines				
Metal mines—				
1974	20 935 501	1 722 680	46 732 326	69 388 507
1975	9 011 375	5 804 924	24 548 032	39 366 331
1976	6 937 229	404 236	41 881 126	49 222 581
1977	14 491 578	1 723 479	45 859 000	62 072 865
1978	10 424 872	575 166	17 908 816	28 908 852
1979	37 395 046	2 672 011	67 851 381	97 898 438
1980	53 579 015	2 561 622	250 726 000	286 646 703
1981	96 533 183	9 803 477	312 669 605	418 946 265
1982	39 165 981	2 969 035	71 110 422	113 245 438
1983	46 535 830	3 503 403	67 156 050	87 195 283
Coal mines—				
1974	9 927 818		16 007 500	25 935 324
1975	1 906 000		59 000 000	62 500 000
1976	16 084 383	55 577	20 767 597	36 866 157
1977	93 466 844		25 943 377	56 410 271
1978	15 232 528		15 621 753	30 854 285
1979	46 575 678	628 021	60 098 107	87 799 796
1980	63 175 491	762 244	68 815 558	132 752 893
1981	6 042 432	18 776 550	247 123 558	271 942 540
1982	65 297 885	1 335 060	261 426 140	368 059 085
1983	86 751 744	8 800 780	236 220 864	331 773 388
Others—				
1974	6 198 552	146 182	16 606 229	22 950 963
1975	17 350 175	124 860	18 077 984	35 552 419
1976	58 980	79 500	1 389 956	1 528 236
1977	452 733	108 500	931 521	1 472 752
1978	102 248	9 579	1 256 869	1 368 696
1979	187 044	80 700	1 033 645	1 251 389
1980	1 139 216	5 461	2 889 032	4 033 709
1981	702 587		1 272 328	1 974 915
1982	367 968		858 800	1 226 768
1983	1 008 083	221 745	1 337 890	2 567 718
Totals—				
1974	36 159 871	1 868 862	79 946 055	117 974 784
1975	29 063 550	5 929 784	101 625 986	137 219 320
1976	23 039 592	588 933	64 038 679	87 616 974
1977	45 391 003	1 830 979	72 733 898	119 955 880
1978	41 749 648	584 745	34 787 442	77 121 835
1979	74 055 768	3 393 732	109 563 123	186 949 623
1980	97 691 722	3 367 327	322 432 356	423 431 405
1981	103 578 202	28 585 027	561 805 791	692 916 520
1982	124 829 834	4 304 095	353 386 362	482 520 291
1983	134 295 657	12 525 928	274 714 804	421 536 389

Table 3-6—Production of Gold, Silver, Copper, Lead, Zinc, Molybdenum, and Iron Concentrates, 1858–1983

Year	Gold (Placer)		Gold (Fine)		Silver		Copper	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
	g	$	g	$	g	$	kg	$
1858–1890	100 978 533	55 192 163			6 876 531	214 152		
1891–1900	11 703 748	6 397 183	19 682 165	12 858 553	700 977 829	13 561 194	16 064 375	4 365 210
1901–1910	15 787 261	8 628 660	72 224 836	47 998 179	971 114 910	16 973 507	172 344 737	56 384 783
1911–1920	8 656 275	4 731 100	63 112 995	41 942 862	994 340 920	22 572 682	231 326 501	100 770 459
1921	426 733	233 200	4 222 699	2 804 197	83 150 418	1 591 201	17 706 790	4 879 624
1922	674 624	368 800	6 153 915	4 089 684	220 872 076	4 554 781	14 678 125	4 329 754
1923	768 555	420 000	5 575 057	3 704 994	187 643 964	3 718 129	26 181 346	8 323 266
1924	769 799	420 750	7 704 711	5 120 535	259 454 010	5 292 184	29 413 222	8 442 870
1925	512 453	280 092	6 522 890	4 335 069	238 088 613	5 286 818	32 797 475	10 153 269
1926	650 426	355 503	6 264 984	4 163 859	334 312 337	6 675 606	40 523 625	12 324 421
1927	285 868	156 247	5 536 365	3 679 601	325 654 164	5 902 043	40 461 530	11 525 011
1928	262 012	143 208	5 619 130	3 734 609	330 536 775	6 182 461	44 410 233	14 265 242
1929	217 192	118 711	4 516 871	3 002 020	309 791 230	5 278 194	46 626 180	18 612 850
1930	278 527	152 235	5 002 482	3 324 975	352 342 964	4 322 185	41 894 588	11 990 466
1931	534 225	291 992	4 545 175	3 020 837	234 837 945	2 254 979	29 080 879	5 365 690
1932	634 501	395 542	5 649 891	4 263 389	222 406 822	2 264 729	22 955 299	3 228 892
1933	744 233	562 787	6 954 289	6 394 645	218 397 615	2 656 526	19 572 164	3 216 701
1934	783 205	714 431	9 244 309	10 253 952	267 920 527	4 088 280	22 521 530	3 683 662
1C35	961 985	895 058	11 363 263	12 856 419	288 323 068	6 005 986	17 884 241	3 073 428
1936	1 349 528	1 249 940	12 583 590	14 172 367	296 944 198	4 308 330	9 830 071	2 053 828
1937	1 684 321	1 558 245	14 331 671	16 122 767	351 630 830	5 073 962	20 891 260	6 023 411
1938	1 796 478	1 671 015	17 340 607	19 613 624	337 827 661	4 722 288	29 832 572	6 558 575
1939	1 547 250	1 478 492	18 267 912	21 226 957	336 577 786	4 381 365	33 227 590	7 392 862
1940	1 215 101	1 236 928	18 149 347	22 461 516	383 436 042	4 715 315	38 371 049	7 865 085
1941	1 361 534	1 385 962	17 760 622	21 984 501	378 700 797	4 658 545	30 134 516	6 700 693
1942	1 023 413	1 041 772	13 825 843	17 113 943	301 011 133	4 080 775	22 723 823	5 052 856
1943	454 104	462 270	6 979 607	8 639 516	265 193 820	3 858 496	19 190 263	4 971 132
1944	355 601	361 977	5 804 815	7 185 332	177 453 003	2 453 293	16 465 584	4 356 070
1945	391 556	398 591	5 454 626	6 751 860	191 510 720	2 893 934	11 726 375	3 244 472
1946	489 219	475 361	3 658 086	4 322 241	197 994 264	5 324 959	7 938 089	2 240 070
1947	216 757	200 585	7 566 880	8 514 870	177 550 262	4 110 092	18 952 769	8 519 741
1948	632 386	585 200	8 902 612	10 018 050	209 016 328	5 040 101	19 515 886	9 616 174
1949	536 308	529 524	8 969 981	10 382 256	237 559 178	5 671 082	24 882 500	10 956 550
1950	595 125	598 717	8 832 723	10 805 553	295 772 610	7 667 950	19 147 001	9 889 458
1951	736 861	717 911	8 126 405	9 627 947	255 632 882	7 770 983	19 617 612	11 980 155
1952	545 982	494 756	7 955 805	8 765 889	274 042 530	7 326 803	19 053 280	13 054 893
1953	443 062	403 230	7 886 228	8 727 294	260 606 407	7 019 272	22 235 441	14 869 544
1954	270 098	238 967	8 036 642	8 803 279	305 630 613	8 154 145	22 747 578	14 599 693
1955	238 436	217 614	7 541 762	8 370 306	245 811 643	6 942 995	20 065 928	16 932 549
1956	120 213	109 450	5 963 782	6 603 628	261 423 017	7 511 866	19 667 923	17 251 872
1957	91 318	80 990	6 948 504	7 495 170	252 847 111	7 077 166	14 237 029	8 170 465
1958	175 732	157 871	6 044 992	6 604 149	218 998 027	6 086 854	5 741 837	2 964 529
1959	235 450	208 973	5 385 360	5 812 511	192 779 535	5 421 417	7 363 374	4 497 991
1960	119 653	107 418	6 394 155	6 979 461	231 612 937	6 600 183	14 997 694	9 583 724
1961	106 248	99 884	4 970 913	5 667 253	229 353 429	6 909 140	14 375 361	8 965 149
1962	103 106	96 697	4 940 712	5 942 101	192 521 474	7 181 907	49 431 850	33 289 215
1963	143 696	135 411	4 820 312	5 850 458	199 764 616	8 861 050	53 635 704	36 238 007
1964	57 292	55 191	4 307 361	5 227 884	163 901 675	7 348 938	52 414 456	38 609 136
1965	26 935	25 053	3 642 908	4 419 089	154 646 729	6 929 793	38 644 540	32 696 081
1966	47 743	44 632	3 717 057	4 506 646	172 594 622	7 729 939	47 980 080	56 438 255
1967	27 713	25 632	3 923 861	4 763 688	192 239 525	10 328 695	78 352 932	88 135 172
1968	20 839	19 571	3 853 537	4 672 242	221 791 325	16 475 795	73 024 968	87 284 148
1969	12 410	11 720	3 654 012	4 427 506	179 169 889	11 100 491	75 937 956	111 592 416
1970	15 272	14 185	3 135 462	3 685 476	202 521 462	12 041 181	96 329 684	124 657 958
1971	5 505	4 647	2 668 046	3 031 844	238 670 301	11 968 046	127 286 040	131 037 918
1972	21 492	26 905	3 782 871	6 995 448	215 420 498	11 519 660	211 832 288	209 403 822
1973	119 156	311 524	5 784 723	18 117 268	236 987 318	19 552 997	317 603 055	582 803 251
1974	45 162	232 512	5 001 082	26 749 083	181 695 950	28 440 365	287 547 048	541 644 913
1975	43 744	232 204	4 819 241	25 082 494	196 305 885	30 545 947	258 497 599	331 693 850
1976	26 064	115 613	5 393 477	21 761 502	239 720 882	32 532 836	263 618 197	378 984 941
1977	46 170	289 075	5 906 336	31 301 931	241 503 007	37 934 098	275 224 115	384 736 661
1978	36 515	295 001	6 542 332	47 951 880	227 271 890	45 071 509	273 692 676	431 694 395
1979	214 106	2 649 918	8 062 810	101 481 156	214 117 518	94 700 656	272 163 001	656 359 923
1980	280 104	6 213 376	7 197 312	163 930 073	203 801 811	156 548 306	264 674 830	670 623 616
1981	291 705	4 540 289	7 468 769	131 542 422	403 754 797	152 420 716	290 088 241	611 282 050
1982	175 607	2 467 470	7 511 908	115 802 480	499 565 577	158 260 320	279 873 599	495 009 799
1983	287 783	4 317 204	7 693 571	126 555 114	402 325 338	180 372 129	282 864 697	561 111 733
Totals	164 430 008	118 653 153	607 407 117	1 324 118 184	18 594 251 570	1 312 942 332	5 337 062 791	7 098 494 399

Table 3-6—Production of Gold, Silver, Copper, Lead, Zinc, Molybdenum, and Iron Concentrates, 1858–1983—Continued

Year	Lead		Zinc		Molybdenum		Iron Concentrates	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
	kg	$	kg	$	kg	$	t	$
1858–1890	473 729	45 527					27 097	70 879
1891–1900	93 002 804	7 581 619					11 820	45 602
1901–1910	184 989 089	17 033 102	5 753 423	894 169			17 738	68 436
1911–1920	191 859 042	21 991 616	118 086 182	19 303 993	11 946	36 698	3 358	18 510
1921	18 779 664	1 693 354	22 416 133	1 952 065			916	5 050
1922	30 593 731	3 480 306	25 921 103	2 777 322			1 089	3 680
1923	43 845 439	6 321 770	26 464 465	3 278 903			220	1 337
1924	77 284 697	12 415 917	35 893 017	4 266 741				
1925	107 908 698	18 670 329	44 568 438	7 754 450				
1926	119 305 027	17 757 535	64 807 554	10 586 610				
1927	128 364 347	14 874 292	65 872 809	8 996 135				
1928	138 408 812	13 961 412	82 445 946	9 984 613			18	
1929	139 705 336	15 555 180	78 061 406	9 268 792				
1930	145 966 952	12 638 198	113 614 910	9 017 005				
1931	118 796 232	7 097 612	91 657 703	5 160 911				
1932	114 308 115	5 326 432	87 143 752	4 621 641				
1933	123 235 512	6 497 719	88 887 198	6 291 416				
1934	157 562 183	8 461 859	113 013 038	7 584 199				
1935	156 156 723	10 785 930	116 227 650	7 940 860				
1936	171 444 146	14 780 028	113 475 574	8 439 373				
1937	190 107 902	21 417 049	132 081 905	14 274 245				
1938	187 323 227	13 810 024	135 395 388	9 172 822				
1939	171 794 338	12 002 390	126 283 585	8 544 375				
1940	211 758 089	15 695 467	141 529 456	10 643 026				
1941	207 218 262	15 358 976	166 861 962	12 548 031				
1942	230 060 714	17 052 054	175 636 580	13 208 636				
1943	199 196 604	16 485 902	152 474 485	13 446 018				
1944	132 866 893	13 181 530	126 126 765	11 956 725				
1945	152 849 156	16 848 823	133 714 538	18 984 581				
1946	156 879 853	23 345 731	124 406 109	21 420 484				
1947	142 306 192	42 887 313	114 761 068	28 412 593				
1948	145 165 821	57 734 770	122 610 001	37 654 211			616	3 735
1949	120 373 215	41 929 866	130 736 145	38 181 214			4 964	27 579
1950	128 830 683	41 052 905	131 697 238	43 769 392				
1951	124 037 181	50 316 015	153 091 761	67 164 754			102 997	798 000
1952	129 250 197	45 936 692	169 130 882	59 189 656			816 898	5 474 924
1953	135 084 129	39 481 244	173 407 848	40 810 618			899 240	6 763 105
1954	150 867 088	45 482 505	151 555 559	34 805 755			486 018	3 733 891
1955	137 241 656	45 161 245	194 680 177	52 048 989			554 223	3 228 756
1956	128 691 681	44 702 619	201 327 284	58 934 801			335 616	2 190 847
1957	127 732 462	39 568 086	203 787 462	50 206 681			324 174	2 200 637
1958	133 615 439	34 627 075	195 952 146	43 234 839			571 769	4 193 442
1959	130 372 360	33 542 306	182 498 693	44 169 198			770 421	6 363 848
1960	151 321 570	38 661 912	182 977 897	50 656 726	2 456	9 500	1 052 651	10 292 847
1961	174 307 617	42 313 569	175 970 780	45 370 891			1 211 147	12 082 540
1962	152 080 806	34 537 454	187 528 084	51 356 376			1 627 342	18 326 911
1963	142 869 197	37 834 714	182 734 698	53 089 163			1 869 089	20 746 424
1964	121 896 644	39 402 293	181 797 313	58 648 561	12 812	47 063	1 816 684	20 419 487
1965	113 489 794	43 149 171	141 179 547	48 666 933	3 306 274	12 405 344	1 964 410	21 498 581
1966	95 929 798	34 436 934	138 401 395	47 666 540	7 754 088	27 606 061	1 952 074	20 778 934
1967	94 406 546	31 432 079	119 217 472	39 248 539	7 945 782	31 183 064	1 954 468	20 820 765
1968	105 063 971	32 782 257	135 803 151	43 550 181	8 980 988	32 552 722	1 900 311	21 437 569
1969	95 286 815	33 693 539	134 565 199	46 639 024	12 064 350	47 999 442	1 882 266	19 787 845
1970	97 448 607	35 096 021	125 005 208	44 111 055	14 186 706	52 561 796	1 704 650	17 391 883
1971	112 865 575	34 711 408	138 549 629	49 745 789	9 926 694	36 954 846	1 750 738	18 153 612
1972	88 109 663	28 896 566	121 719 968	47 172 894	12 719 391	43 260 349	1 139 698	11 642 379
1973	84 890 924	30 477 936	137 380 768	62 564 751	13 785 264	51 851 509	1 420 160	12 906 063
1974	55 252 692	23 333 016	77 733 732	59 582 753	13 789 825	60 791 552	1 306 930	12 742 227
1975	70 603 483	24 450 158	99 668 230	80 572 872	13 026 627	71 201 391	1 305 840	15 273 878
1976	85 407 582	32 796 533	106 498 987	65 499 108	14 088 686	94 109 138	1 255 277	14 760 526
1977	78 172 646	42 316 293	103 780 228	61 301 001	15 521 970	142 057 947	445 317	7 362 345
1978	81 064 539	51 640 564	95 618 111	52 048 701	13 055 203	167 714 272	615 569	11 597 462
1979	84 451 905	88 100 363	88 418 642	61 890 891	10 766 497	321 228 104	668 026	13 088 475
1980	76 709 447	66 096 223	67 481 328	49 363 417	11 179 501	288 934 398	653 324	13 670 233
1981	84 854 093	61 529 276	79 214 552	67 026 535	12 933 224	198 240 391	602 272	14 274 498
1982	83 746 551	43 035 587	75 182 699	63 571 545	14 747 888	154 980 970	774 951	19 630 010
1983	112 941 984	48 778 436	95 266 818	79 634 214	10 778 825	87 584 823	496 823	13 078 465
Totals	8 278 636 869	1 924 102 835	7 827 781 784	2 189 859 222	220 584 997	1 923 321 380	36 299 129	416 868 137

Table 3-7A—Mineral Production by Mining

Division	Period	Placer Gold		Metals	Industrial Minerals	Structural Materials
		Quantity	Value			
		g	$	$	$	$
Alberni	1982			37 737 011		922 665
	1983			**37 911 193**		**662 710**
	To Date	50 294	33 253	481 242 521	9 398	13 728 858
Atlin	1982	63 422	698 894	1 717		12 500
	1983	**166 942**	**2 504 125**	**20 538**		
	To Date	23 425 055	24 530 459	38 306 350	20 325	503 069
Cariboo	1982	26 825	427 076	79 242 144	6 850	8 179 935
	1983	**71 576**	**1 073 410**	**65 406 772**	**158 260**	**21 366 269**
	To Date	81 435 576	57 189 036	998 750 974	1 494 537	117 579 281
Clinton	1982	2 120	33 005	108		578 884
	1983					**1 752 368**
	To Date	319 957	299 053	848 537	162 427	18 102 915
Fort Steele	1982			105 468 723	4 444 686	1 628 117
	1983			**141 581 223**	**4 068 104**	**3 119 798**
	To Date	639 241	472 087	3 494 752 383	48 664 029	24 728 214
Golden	1982				6 408 706	756 431
	1983				**6 997 599**	**1 654 438**
	To Date	16 403	51 639	67 075 470	57 280 229	9 078 162
Greenwood	1982			3 921 009	185 123	407 937
	1983			**4 081 002**	**130 000**	**1 275 480**
	To Date	159 178	132 270	269 235 258	3 085 230	7 593 401
Kamloops	1982			274 696 658		24 968 817
	1983			**331 246 860**		**21 299 262**
	To Date	883 329	1 021 423	2 691 203 715	6 542 538	203 054 330
Liard	1982	318	5 047	13 024 457	73 457 544	5 114 496
	1983			**19 389 074**	**66 318 212**	**11 922 081**
	To Date	1 598 833	1 879 492	80 120 287	884 275 135	62 560 554
Lillooet	1982	1 330	17 519	64		1 050 384
	1983			**19 237**	**18 060**	**980 274**
	To Date	2 895 325	1 965 519	148 522 318	491 155	8 411 841
Nanaimo	1982			137 169 938	77 963	11 524 968
	1983			**160 717 621**	**78 088**	**13 693 798**
	To Date	30 735	65 239	1 636 158 537	3 296 442	176 057 225
Nelson	1982				1 183 893	792 055
	1983			**38 699**	**906 851**	**1 582 300**
	To Date	111 535	89 026	409 753 910	14 535 596	24 732 129
New Westminster	1982			4 057 505		27 191 275
	1983			**9 921 926**		**30 225 133**
	To Date	975 418	597 152	77 748 404	1 611 625	451 511 348
Nicola	1982			7 123 277		314 612
	1983			**1 024 361**		**1 142 454**
	To Date	7 278	4 764	517 559 675	10 050	5 984 225
Omineca	1982	18 165	281 425	199 764 897	70 000	923 902
	1983	**49 130**	**737 652**	**116 620 296**	**1 003 053**	**3 353 457**
	To Date	1 839 029	2 801 949	1 947 323 076	3 396 946	42 599 871
Osoyoos	1982			51 903 509	31 796	272 214
	1983			**38 288 637**	**26 974**	**1 077 669**
	To Date	9 472	47 402	789 326 343	6 940 653	10 596 259
Revelstoke	1982	1 123	15 754	21		2 032 861
	1983	**135**	**2 017**	**16 162 250**		**2 786 314**
	To Date	241 575	270 192	31 686 152		13 406 716
Similkameen	1982			48 172 695		807 269
	1983			**51 048 450**		
	To Date	1 418 222	916 258	663 003 859	18 558	7 746 859
Skeena	1982			62 833 666		2 484 309
	1983			**66 985 767**		**5 301 636**
	To Date	143 447	108 951	893 734 076	1 240 215	61 980 690
Slocan	1982			6 102 357		1 426 285
	1983			**6 540 049**		**2 338 733**
	To Date	11 384	9 397	323 934 188		8 267 913
Trail Creek	1982			23 350		360 654
	1983			**57 850**		**299 354**
	To Date	26 469	24 260	91 210 475		9 148 116
Vancouver	1982			4 981 592		60 014 599
	1983					**68 736 765**
	To Date	6 026	9 723	360 594 374	7 066 964	558 452 401
Vernon	1982					3 149 129
	1983			**6 298**		**3 500 676**
	To Date	116 328	532 340	405 005	244 239	36 051 374
Victoria	1982					8 175 340
	1983					**11 330 559**
	To Date	19 533	15 680	24 812 286	190 811	443 462 892
Not Assigned	1982	62 304	988 750	18 796 208	9 777 657	1 067 006
	1983			**34 630 555**	**9 791 233**	
	To Date	48 050 366	25 586 571	521 517 836	125 146 018	80 143 885
Totals	1982	175 607	2 467 470	1 055 020 910	95 644 218	164 156 644
	1983	**287 783**	**4 317 204**	**1 101 698 658**	**89 496 434**	**208 401 528**
	To Date	164 430 008	118 653 135	16 558 826 009	1 165 723 120	2 395 482 528

Divisions, 1982 and 1983, and Total to Date

Coal		Crude Oil and Condensates		Natural Gas Delivered to Pipeline		Butane and Propane		Division Totals
Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	
t	$	m³	$	10³m³	$	m³	$	$
								38 659 676
								38 573 903
								395 014 030
								713 111
								2 524 663
								63 360 203
								87 856 005
263	1 100							**88 004 711**
								1 175 013 928
								611 997
								1 752 368
10 645 467	566 865 449							19 412 932
11 480 219	**555 785 816**							678 406 975
170 572 242	4 557 041 836							**704 554 941**
								8 125 658 549
								7 165 137
								8 652 037
								133 485 500
								4 513 069
								5 486 482
								280 046 159
								299 665 475
13 687	59 765							**352 546 122**
		2 234 214	356 995 398	7 188 561	542 664 470	158 226	13 242 687	2 901 881 771
		2 210 391	**425 712 363**	**6 899 911**	**455 187 128**	**142 785**	**18 451 788**	1 003 504 089
206 993	2 513 857	62 822 219	2 614 071 231	168 153 699	4 676 317 642	3 581 401	106 825 160	**996 980 646**
								8 428 563 358
								1 067 962
								1 017 571
								159 390 833
								148 772 869
67 425 673	301 144 744							**174 489 507**
								2 116 722 187
								1 975 948
								2 527 850
								449 110 661
								31 248 780
								40 147 059
								531 468 529
								7 437 889
2 657 660	11 080 836							**2 166 815**
275	12 791							534 639 550
79	**3 380**							201 053 015
469 200	3 533 736							**121 717 838**
								1 999 655 578
								52 207 519
1 018	5 008							**39 393 280**
								806 915 665
								2 048 636
								17 950 581
								45 363 060
								48 979 968
4 188 851	19 553 725							**51 048 450**
								691 239 259
								65 317 975
33	116							**72 287 403**
								957 064 048
								7 528 642
								8 878 782
								332 211 498
								384 004
								357 204
								100 382 851
								64 996 191
								68 736 765
								926 123 462
								3 149 129
								3 506 974
								37 232 958
								8 175 340
								11 330 559
								468 481 669
								30 629 621
								44 421 788
								752 394 310
10 645 742	566 878 240	2 234 214	356 995 398	7 188 561	542 664 470	158 226	13 242 687	2 797 070 037
11 480 298	**555 789 196**	**2 210 391**	**425 712 363**	**6 899 911**	**455 187 128**	**142 785**	**18 451 788**	**2 859 054 299**
245 535 620	4 894 934 723	62 822 219	2 614 071 231	168 153 699	4 676 317 642	3 581 401	106 825 160	32 530 833 548

Table 3-7B—Production of Lode Gold, Silver, Copper, Lead and Zinc by Mining Divisions, 1982 and 1983, and Total to Date

Division	Period	Lode Gold		Silver		Copper		Lead		Zinc		Division Total
		Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	
		g	$	g	$	kg	$	kg	$	kg	$	$
Alberni	1982	611 090	8 693 012	29 830 007	8 629 269	2 424 042	3 725 349	2 177 863	1 194 662	15 190 177	15 461 602	37 703 894
	1983	**533 456**	**8 955 988**	**24 277 134**	**11 152 715**	**2 183 752**	**3 802 050**	**1 903 175**	**338 827**	**12 845 056**	**13 641 470**	**37 891 050**
	To Date	17 997 274	74 978 402	403 577 600	84 679 509	58 664 566	81 649 128	28 901 127	15 423 750	266 851 482	170 854 681	427 585 470
Atlin	1982	.....	.....	10 481	1 717	.....	.....	.....	.....	.....	.....	1 717
	1983	.....	.....	**44 649**	**20 538**	.....	.....	.....	.....	.....	.....	**20 538**
	To Date	10 706 876	12 135 261	106 086 705	3 114 625	11 239 185	8 160 621	10 833 419	3 464 687	41 313 775	10 869 006	37 744 200
Cariboo	1982	260 978	3 891 793	4 292 959	938 148	30 965 083	60 078 908	.....	.....	.....	.....	64 908 849
	1983	**205 591**	**3 404 366**	**3 760 807**	**1 867 126**	**26 917 380**	**54 122 879**	.....	.....	.....	.....	**59 394 371**
	To Date	38 244 632	57 919 608	42 599 234	13 694 001	409 340 440	744 044 990	20 718	11 194	2 445	1 241	815 671 034
Clinton	1982	.....	.....	315	108	.....	.....	.....	.....	.....	.....	108
	1983	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	To Date	727 499	827 328	982 833	14 397	26 103	5 905	88	7	.....	.....	847 637
Fort Steele	1982	.....	.....	85 977 381	26 919 004	.....	.....	69 239 516	35 310 941	51 499 674	40 778 209	103 008 154
	1983	.....	.....	**115 089 302**	**51 250 592**	.....	.....	**102 319 448**	**44 641 992**	**55 292 024**	**42 925 701**	**138 818 285**
	To Date	390 707	749 363	8 520 947 234	464 898 425	7 163 855	12 534 149	7 001 546 567	1 612 104 869	5 274 844 840	1 341 640 947	3 431 927 753
Golden	1982	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	1983	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	To Date	14 199	28 757	145 133 213	5 422 871	534 700	371 849	118 229 049	26 466 805	152 500 635	33 583 756	65 874 038
Greenwood	1982	4 168	58 119	12 041 275	3 740 918	25	20	99 477	45 407	107 464	76 308	3 920 772
	1983	**4 600**	**69 588**	**9 264 884**	**3 903 928**	**345**	**506**	**90 467**	**29 737**	**27 874**	**77 191**	**4 080 950**
	To Date	43 586 564	41 035 482	1 449 368 629	68 146 119	273 353 016	153 551 101	12 313 931	3 144 382	12 105 334	3 144 179	269 021 263
Kamloops	1982	304 455	5 543 673	31 732 963	8 373 195	128 292 126	212 717 690	518	240	192	123	226 634 921
	1983	**533 736**	**6 911 714**	**36 216 541**	**15 834 449**	**136 096 790**	**265 608 961**	.....	.....	.....	.....	**288 355 124**
	To Date	8 821 542	103 977 019	330 299 889	91 366 932	1 258 724 788	2 160 609 611	401 661	122 799	245 844	53 511	2 356 129 872
Liard	1982	891 567	13 024 441	41	16	.....	.....	.....	.....	.....	.....	13 024 457
	1983	**1 235 566**	**19 389 074**	.....	.....	.....	.....	.....	.....	.....	.....	**19 389 074**
	To Date	3 677 153	60 698 319	548 904	271 006	13 570 392	19 147 861	7 428	2 736	804	286	80 120 208
Lillooet	1982	.....	.....	249	64	.....	.....	.....	.....	.....	.....	64
	1983	**1 356**	**19 237**	.....	.....	.....	.....	.....	.....	.....	.....	**19 237**
	To Date	130 211 779	147 711 754	30 734 694	721 718	181	41	28 413	2 587	144	119	148 436 219
Nanaimo	1982	1 352 379	21 703 422	12 182 454	4 345 295	51 534 219	96 995 770	.....	.....	.....	.....	123 044 487
	1983	**1 562 016**	**27 063 422**	**13 402 457**	**6 613 975**	**57 427 186**	**117 213 556**	.....	.....	.....	.....	**150 890 953**
	To Date	25 255 009	194 569 228	178 706 867	42 431 759	641 484 158	1 124 276 418	.....	.....	.....	.....	1 361 277 405
Nelson	1982	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	1983	**2 410**	**37 880**	**2 518**	**819**	.....	.....	.....	.....	.....	.....	**38 699**
	To Date	41 764 463	42 597 322	324 117 544	9 143 323	6 765 621	1 689 384	240 837 922	69 419 737	686 788 568	223 722 156	346 571 922
New Westminster	1982	275 516	4 051 982	12 095	5 523	.....	.....	.....	.....	.....	.....	4 057 505
	1983	**597 443**	**9 895 881**	**62 746**	**26 045**	.....	.....	.....	.....	.....	.....	**9 921 926**
	To Date	1 013 119	14 079 407	545 087	39 297	11 333 143	11 553 105	12 893	1 119	5 786	481	25 673 409
Nicola	1982	.....	.....	.....	.....	2 907 623	5 544 089	.....	.....	.....	.....	5 544 089
	1983	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	To Date	343 376	396 641	8 605 983	140 939	391 826 751	503 810 678	1 017 092	91 649	147 156	11 135	504 451 042

Omineca	1982	1 828 355	28 861 199	272 901 740	89 190 956	23 764 131	43 609 965	7 161	3 315	14 361	11 500	161 676 935
	1983	**1 115 792**	**19 206 900**	**154 118 934**	**68 681 595**	**6 966 618**	**14 181 706**	**35 645**	**20 420**	**31 158**	**34 850**	**102 125 471**
	To Date	17 348 340	159 309 620	981 597 769	243 775 395	384 893 216	651 283 776	13 925 023	4 010 533	19 735 609	6 283 622	1 064 632 946
Osoyoos	1982	163 933	2 310 359	5 845 925	1 757 755	10 286 606	18 470 333	170	87			22 518 534
	1983	**114 917**	**1 963 727**	**5 623 549**	**2 634 189**	**9 465 992**	**19 331 528**					**23 929 444**
	To Date	53 892 165	66 677 913	232 606 584	37 250 915	179 654 011	290 972 052	305 902	102 095	202 376	79 989	395 042 964
Revelstoke	1982			70	21							21
	1983			**2 408 093**	**1 045 871**	**7 768 007**	**14 917 677**			**159 074**	**198 702**	**16 162 250**
	To Date	1 163 843	1 088 308	130 743 739	3 879 528	7 837 717	14 968 714	16 411 486	3 880 101	12 474 695	3 516 684	27 333 335
Similkameen	1982	521 263	7 560 921	4 219 373	1 238 812	21 274 659	39 372 966					48 172 699
	1983	**513 705**	**8 536 328**	**4 563 813**	**2 009 659**	**20 782 550**	**40 502 463**					**51 048 450**
	To Date	15 075 248	96 712 264	170 633 248	13 899 753	512 788 558	552 239 334	178 550	15 137	36 494	5 258	662 871 746
Skeena	1982	1 160 029	17 463 343	6 184 755	1 994 038	8 088 375	14 085 466					33 542 847
	1983	**1 166 037**	**19 358 267**	**10 881 283**	**5 152 189**	**15 068 455**	**31 194 [illegible]**	**3 237**	**2 287**	**1 931**	**1 801**	**55 709 388**
	To Date	80 746 438	113 199 251	2 313 869 989	73 244 695	547 359 442	465 0[illegible]	27 258 410	5 472 430	7 861 319	2 575 161	659 530 218
Slocan	1982	348	5 472	13 116 360	4 468 473	32		1 161 490	773 685	713 760	854 609	6 102 279
	1983	**401**	**7 878**	**10 619 900**	**5 034 859**			**1 000 427**	**553 086**	**723 207**	**942 599**	**6 538 422**
	To Date	605 206	995 699	2 525 379 933	90 622 922	7 085	[illegible]	521 227 677	113 843 160	438 661 198	112 551 373	318 015 952
Trail Creek	1982	1 555	23 350									23 350
	1983	**2 603**	**46 549**	**31 575**	**11 187**			**294**	**97**	**24**	**17**	**57 850**
	To Date	92 889 769	63 721 893	117 218 319	2 543 591	55 592 776	18 245 404	175 923	61 757	198 067	87 767	84 660 412
Vancouver	1982	234 346	4 010 550	983 585	318 005	16 567	18 600	360 198	216 100	566 742	418 337	4 981 592
	1983											
	To Date	20 562 781	66 166 414	198 394 849	10 061 076	507 113 531	243 157 095	13 158 882	5 157 827	114 013 095	34 845 886	359 388 298
Vernon	1982											
	1983			**18 659**	**6 298**							**6 298**
	To Date	165 633	189 982	2 319 862	172 858	297	100	87 255	29 866	33 939	11 667	404 473
Victoria	1982											
	1983											
	To Date	1 375 157	1 236 720	29 478 396	654 567	29 775 654	22 581 791	95 298	19 848	1 618 731	283 923	24 776 849
Not Assigned	1982	– 98 074	– 1 399 156	20 233 549	6 339 003	320 111	390 603	10 700 158	5 491 150	7 090 329	5 970 857	16 792 457
	1983	**103 942**	**1 688 315**	**11 938 494**	**5 126 095**	**187 622**	**235 563**	**7 589 291**	**3 191 990**	**26 206 470**	**21 811 883**	**32 053 846**
	To Date	828 345	3 116 229	349 754 466	52 852 111	28 063 605	18 599 813	271 662 155	61 253 760	798 139 448	245 736 394	381 558 307
Total	1982	7 511 908	115 802 480	499 565 577	158 260 320	279 873 599	495 009 799	83 746 551	43 035 587	75 182 699	63 571 545	875 679 731
	1983	**7 693 571**	**126 555 114**	**402 325 338**	**180 372 129**	**282 864 697**	**561 111 733**	**112 941 984**	**48 778 436**	**95 286 818**	**79 634 214**	**996 451 626**
	To Date	607 407 117	1 324 118 184	18 594 251 570	1 313 042 332	5 337 112 791	7 098 494 399	8 278 636 869	1 924 102 835	7 827 781 784	2 189 859 222	13 849 616 972

Table 3-7C—Production of Miscellaneous Metals by Mining Divisions, 1982 and 1983, and Total to Date

Division	Period	Antimony		Bismuth		Cadmium		Chromite		Iron Concentrates		Manganese		Mercury	
		Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
		kg	$	kg	$	kg	$	t	$	t	$	t	$	kg	$
Alberni	1982					15 948	33 117								
	1983					**14 041**	**20 143**								
	To Date					649 263	4 022 340			4 293 517	49 634 711				
Atlin	1982														
	1983														
	To Date					144 799	561 790								
Cariboo	1982														
	1983														
	To Date														
Clinton	1982														
	1983							114	900						
	To Date									36 168	891 903				
Fort Steele	1982									**30 511**	**777 725**				
	1983									1 484 184	18 582 611				
	To Date					1 542 022	10 064 486								
Golden	1982														
	1983														
	To Date					259 654	1 186 526								
Greenwood	1982	18 172	14 906			349	237								
	1983					**68**	**52**								
	To Date					38 344	182 600	608	31 395						
Kamloops	1982													4 984	5 795
	1983					99	641			19 204	95 851				
	To Date														
Liard	1982														
	1983														
	To Date														
Lillooet	1982													4 187	41 304
	1983														
	To Date	6 108	4 321												
Nanaimo	1982									15 872 977	152 633 401				
	1983														
	To Date														
Nelson	1982														
	1983					4 059 962	19 859 034								
	To Date														
New Westminster	1982														
	1983									43 093	1 579 188				
	To Date									**23 906**	**1 024 361**				
Nicola	1982									495 557	13 108 633				
	1983														
	To Date														

Omineca	1982													6 085 216	49 171 164
	1983					135 245	628 342								
	To Date	53 697	21 882												
Osoyoos	1982											15			
	1983														
	To Date														
Revelstoke	1982														
	1983					46 997	176 102								
	To Date	4 261	3 455												
Similkameen	1982														
	1983									695 690	17 158 919				
	To Date									**442 406**	**11 276 379**				
Skeena	1982									14 133 191	182 811 005				
	1983					64 360	316 764								
	To Date					19	78								
Slocan	1982					**1 992**	**1 627**					491	8 160		
	1983					1 247 593	5 901 943								
	To Date	14 453	8 133												
Trail Creek	1982									499	1 925				
	1983					52	210								
	To Date														
Vancouver	1982														
	1983					257 261	1 206 076								
	To Date														
Vernon	1982														
	1983					86	532								
	To Date														
Victoria	1982											1 058	24 508		
	1983					3 175	10 929								
	To Date					131 378	252 833								
Not Assigned	1982	213 519	1 161 543	27 305	83 007	**122 070**	**402 021**								
	1983	**263 724**	**1 432 021**	**47 427**	**215 319**	12 752 918	45 931 280								
	To Date	27 844 289	31 558 090	3 440 593	16 710 625										
Totals	1982	213 519	1 161 543	27 305	83 007	147 656	786 265			774 951	19 630 010				
	1983	**263 724**	**1 432 021**	**47 427**	**215 319**	**138 171**	**423 843**			**496 823**	**13 078 465**				
	To Date	27 940 980	31 610 787	3 440 593	16 710 625	21 201 830	90 049 595	722	32 295	36 299 129	416 868 137	1 564	32 668	6 094 387	49 218 263

Table 3-7C—Production of Miscellaneous Metals by Mining Divisions, 1982 and 1983, and Total to Date—Continued

Division	Period	Molybdenum		Nickel		Palladium		Platinum		Tin		Tungsten (WO_3)		Other Value	Division Total
		Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value		
		kg	$	kg	$	kg	$	g	$	kg	$	kg	$	$	$
Alberni	1982														33 117
	1983														**20 143**
	To Date														53 657 051
Atlin	1982														
	1983														
	To Date														
Cariboo	1982	1 225 750	14 333 295									132	360		562 150
	1983	**714 141**	**6 012 401**												14 333 295
	To Date	19 179 333	183 055 557					1 883	2 952			12 564	21 431		**6 012 401**
Clinton	1982														183 079 940
	1983														
	To Date														
Fort Steele	1982									115 261	1 568 666				900
	1983									**136 347**	**1 985 213**				2 460 569
	To Date									9 888 387	34 089 349			88 184[1]	**2 762 938**
Golden	1982														62 824 630
	1983														
	To Date														
Greenwood	1982														1 201 432
	1983														237
	To Date														**52**
Kamloops	1982	4 131 225	46 947 387												213 995
	1983	**4 318 726**	**42 891 736**									104 730	1 114 350		48 061 737
	To Date	26 599 124	333 857 206												**42 891 736**
Liard	1982											104 730	1 114 350		335 073 843
	1983														
	To Date														
Lillooet	1982							62	79						79
	1983														
	To Date	666	2 440												
Nanaimo	1982	1 785 863	14 125 451					93	113			14 675	37 921		86 099
	1983	**1 672 777**	**9 826 668**												14 125 451
	To Date	11 461 792	122 247 731												**9 826 668**
Nelson	1982														274 881 132
	1983														
	To Date	6 819	18 378												
New Westminster	1982											8 056 095	43 304 576		63 181 988
	1983														
	To Date			23 337 783	51 698 754										
Nicola	1982													376 241[2]	52 074 995
	1983														1 579 188
	To Date														**1 024 361**
															13 108 633

Omineca	1982	2 574 426	38 087 962													38 087 962
	1983	**1 223 038**	**14 494 825**													**14 494 825**
	To Date	99 733 195	828 140 458					93	154			1 002 839	4 697 710	420[2]		882 660 130
Osoyoos	1982	2 473 945	29 364 975													29 364 975
	1983	**2 250 143**	**14 359 193**													**14 359 193**
	To Date	46 583 842	394 243 379													394 243 379
Revelstoke	1982															
	1983															
	To Date	1 190 713	4 167 573									3 531	5 687			4 352 817
Similkameen	1982															
	1983															
	To Date							40 246	132 113							132 113
Skeena	1982	2 556 679	12 131 900													29 290 819
	1983															**11 276 379**
	To Date	13 576 543	51 074 369									166	331	1 389[3]		234 203 858
Slocan	1982															78
	1983															**1 627**
	To Date															5 918 236
Trail Creek	1982															
	1983															
	To Date	1 652 970	6 514 289			23 296	30 462	1 649	3 177							6 550 063
Vancouver	1982															
	1983															
	To Date															1 206 076
Vernon	1982															
	1983															
	To Date															532
Victoria	1982															
	1983															
	To Date															35 437
Not Assigned	1982															2 003 751
	1983													506 368		**2 576 709**
	To Date							16	213	312 665	3 264 100			42 495 221		139 959 529
Totals	1982	14 747 888	154 990 970							115 261	1 568 666	104 730	1 114 350	506 368		179 341 179
	1983	**10 178 825**	**87 584 823**							**136 347**	**1 985 213**			**527 348**		**105 247 032**
	To Date	219 984 997	1 923 321 380	23 337 783	51 698 754	23 296	30 462	44 042	138 801	10 201 052	37 353 449	9 194 732	49 182 366	42 961 455	2 709 209 037	

[1] Magnesium. [2] Cobalt. [3] Selenium.

Table 3-7D—Production of Industrial Minerals by

Division	Period	Asbestos		Barite[1]		Diatomite		Fluxes (Quartz and Limestone)		Granules (Quartz, Limestone, and Granite)	
		Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
		t	$	t	$	t	$	t	$	t	$
Alberni	1982										
	1983										
	To Date										
Atlin	1982										
	1983										
	To Date										
Cariboo	1982					137	6 850				
	1983					**1 955**	**158 260**				
	To Date					35 844	1 351 057				
Clinton	1982									44	168
	1983										
	To Date										
Fort Steele	1982										
	1983										
	To Date										
Golden	1982			7	80						
	1983							34 793	940 613		
	To Date							**36 550**	**1 081 264**		
Greenwood	1982			398 388	4 489 227			103 252	2 445 872		
	1983									3 060	185 123
	To Date									**9 750**	**130 000**
Kamloops	1982							1 624 308	1 540 319	22 218	761 333
	1983										
	To Date									703	14 230
Liard	1982	76 084	57 032 422								
	1983	**81 653**	**53 395 853**								
	To Date	1 952 140	796 384 463								
Lillooet	1982										
	1983										
	To Date										
Nanaimo	1982							19 008	77 963		
	1983							**16 928**	**78 088**		
	To Date							1 125 821	2 519 293	31 506	777 149
Nelson	1982									17 194	1 183 893
	1983							**598**	**6 962**	**40 804**	**899 889**
	To Date							7 493	15 136	363 603	14 464 559
New Westminster	1982										
	1983										
	To Date									99 490	1 611 625
Nicola	1982										
	1983										
	To Date										
Omineca	1982										
	1983										
	To Date									307	22 551
Osoyoos	1982									708	31 796
	1983									**1 365**	**26 974**
	To Date							728 113	3 699 031	199 475	2 909 151
Similkameen	1982										
	1983										
	To Date										
Skeena	1982										
	1983										
	To Date							545 232	1 050 722		
Slocan	1982										
	1983										
	To Date										
Vancouver	1982										
	1982										
	To Date									26 936	418 606
Vernon	1982										
	1983										
	To Date							2 926	49 298	7 210	190 963
Victoria	1982										
	1983										
	To Date							286	3 505	8 713	157 080
Not Assigned	1982										
	1983										
	To Date										
Totals	1982	76 084	57 032 422	.....	.....	137	6 850	53 801	1 018 576	20 962	1 400 812
	1983	**81 653**	**53 395 853**	.....	.....	**1 955**	**158 260**	**54 076**	**1 166 314**	**51 919**	**1 056 863**
	To Date	1 952 140	796 384 463	398 395	4 489 307	35 844	1 351 057	4 137 431	11 323 176	760 205	21 327 415

[1] From 1972, excludes production which is confidential.
Other: *See* notes on individual materials listed alphabetically in text.
[2] Natro-alunite.
[3] Hydromagnesite.
[4] Volcanic ash.
[5] Magnesium sulphate.
[6] Sodium carbonate.
[7] Phosphate rock.

Mining Divisions, 1982 and 1983, and Total to Date

Gypsum and Gypsite		Jade		Mica		Sulphur		Other, Value	Division Total
Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value		
t	$	kg	$	t	$	t	$	$	$
								9 398[2]	9 398
								20 325[3]	20 325
									6 850
									158 260
				4 542 160	143 012			300[4]	1 494 537
792	6 236							156 191[1 5 6]	162 427
						65 315	4 444 686		4 444 686
						67 498	**4 068 104**		**4 068 104**
102 400	298 824					1 895 592	48 348 231	16 894[7]	48 664 029
415 458	5 468 093								6 408 706
459 815	**4 917 144**							**999 191**	**6 997 599**
9 312 607	49 344 663							1 000 467[8 9 17]	57 280 229
									185 123
									130 000
								783 578[10]	3 085 230
1 131 179	6 323 178			192 640	2 075			203 055[5 6]	6 542 538
		42 394	250 861			233 714	16 174 261		73 457 544
		41 837	**397 172**			**279 025**	**12 525 187**		**66 318 212**
		1 729 514	6 415 136			2 105 034	81 475 536		884 275 135
								18 060[14]	**18 060**
		253 391	467 966					23 189[9]	491 155
									77 963
									78 088
									3 296 442
									1 183 893
									906 851
								55 901[8]	14 535 596
									1 611 625
2 184	10 050								10 050
		36 287	70 000						70 000
		54 431	**180 000**					**823 053**	**1 003 053**
		839 166	2 539 882					834 513[11 12 15 16]	3 396 946
									31 796
									26 974
				720 664	25 938			306 535[5 10 11]	6 940 653
227	1 700							16 858[13]	18 558
				287 689	10 815	37 761	178 678		1 240 215
						623 773	6 550 969	97 389[9]	7 066 964
				72 801	3 978				244 239
								30 226[8 9]	190 811
						124 863	8 496 913	1 280 744[1 6 14 15 16]	9 777 657
						137 210	**8 269 663**	**1 521 570**	**9 791 233**
						6 188 460	108 889 611	16 256 407	125 146 018
415 458	5 468 093	78 681	320 861			423 892	29 115 860	1 280 744	95 644 218
459 815	**4 917 144**	**96 268**	**577 172**			**483 733**	**24 862 954**	**3 361 874**	**89 496 434**
10 549 389	55 984 651	2 822 071	9 422 984	5 815 954	185 818	10 850 591	245 443 025	19 811 224	1 165 723 120

[8] Iron oxide and ochre.
[9] Talc.
[10] Fluorspar.
[11] Arsenious oxide.
[12] Perlite.
[13] Bentonite.
[14] Pumice.
[15] Sodium Antimonate.
[16] Sodium Sulphate.
[17] Magnesite.

Table 3-7E—Production of Structural Materials by Mining Divisions 1982 and 1983, and Total to Date

Division	Period	Cement	Lime and Lime-stone	Building Stone	Rubble, Riprap, and Crushed Rock	Sand and Gravel	Clay Products	Unclassified Materials	Division Total
		$	$	$	$	$	$	$	$
Alberni	1982					922 665			922 665
	1983					**662 710**			**662 710**
	To Date				346 659	13 382 199			13 728 858
Atlin	1982					12 500			12 500
	1983								
	To Date		1 108		102 453	399 508			503 069
Cariboo	1982		645 252		3 494 338	4 040 345			8 179 935
	1983	**302 400**	**847 676**		**7 438 592**	12 777 601			**21 366 269**
	To Date	302 400	7 401 641		34 776 675	74 766 108	332 457		117 579 281
Clinton	1982				16 608	562 276			578 884
	1983				**143 268**	**1 609 100**			**1 752 368**
	To Date				3 512 952	14 589 963			18 102 915
Fort Steele	1982					1 628 117			1 628 117
	1983				**19 068**	**3 100 712**			**3 119 798**
	To Date		43 873	71 941	3 056 150	21 540 332	15 918		24 728 214
Golden	1982				511 055	245 376			756 431
	1983					**1 654 438**			**1 654 438**
	To Date		1 000	50 840	766 978	8 131 185	128 159		9 078 162
Greenwood	1982		10 000			397 937			407 937
	1983					**1 275 480**			**1 275 480**
	To Date		150 259	161 090	278 474	6 882 295	121 283		7 593 401
Kamloops	1982	17 244 234	5 418	19 672	4 968 668	2 730 825			24 968 817
	1983	**10 377 304**		**19 672**	**5 957 638**	**4 944 648**			**21 299 262**
	To Date	128 090 796	30 485	59 144	34 367 568	40 433 958	72 379		203 054 330
Liard	1982				49 634	5 064 862			5 114 496
	1983				**891 126**	**11 030 955**			**11 922 081**
	To Date				5 652 670	56 907 884			62 560 554
Lillooet	1982		564 508		4 446	481 430			1 050 384
	1983		**604 011**		**2 280**	**373 983**			**980 274**
	To Date		3 362 144	11 755	1 145 653	3 892 289			8 411 841
Nanaimo	1982		6 642 820		1 017 094	3 865 054			11 524 968
	1983		**8 629 536**		**1 144 190**	**3 920 072**			**13 693 798**
	To Date		109 682 907	3 450 735	12 613 139	49 131 452	1 178 992		176 057 225
Nelson	1982				336	791 719			792 055
	1983				**72**	**1 582 228**			**1 582 300**
	To Date		8 007 648	437 138	627 773	15 637 596	21 974		24 732 129
New Westminster	1982		152 139		2 684 097	18 501 778	5 853 261		27 191 275
	1983		**139 766**		**543 073**	**22 206 348**	**7 335 946**		**30 225 133**
	To Date		4 294 155	20 974	31 486 122	261 361 653	154 348 444		451 511 348
Nicola	1982					314 612			314 612
	1983				**43 459**	**1 098 995**			**1 142 454**
	To Date			8 000	231 453	5 744 772			5 984 225
Omineca	1982		8 211			915 691			923 902
	1983					**3 353 457**			**3 353 457**
	To Date		62 242	701	13 917 687	28 613 967	5 274		42 599 871
Osoyoos	1982					272 214			272 214
	1983				**610**	**1 077 059**			**1 077 669**
	To Date		43 774	33 018	355 959	10 163 508			10 596 259
Revelstoke	1982			4 875	25 435	2 002 551			2 032 861
	1983			**8 375**	**839 003**	**938 936**			**1 786 314**
	To Date		1 000	112 070	4 015 957	9 277 689			13 406 716
Similkameen	1982					807 269			807 269
	1983								
	To Date	10 500	11 571	24 000	712 341	6 975 092	13 355		7 746 859
Skeena	1982				88 552	2 395 757			2 484 309
	1983				**842 421**	**4 459 215**			**5 301 636**
	To Date		1 661 362	144 000	17 169 042	42 993 037	13 249		61 980 690
Slocan	1982		1 211 134			215 151			1 426 285
	1983		**1 905 796**			**432 937**			**2 338 733**
	To Date		3 117 930	115 143	157 323	4 877 517			8 267 913
Trail Creek	1982					360 654			360 654
	1983					**299 354**			**299 354**
	To Date		32 500	85 520	381 393	8 648 703			9 148 116
Vancouver	1982	52 021 479	1 225 315		3 509	6 764 296			60 014 599
	1983	**60 401 278**			**33 543**	**8 301 944**			**68 736 765**
	To Date	421 041 261	1 266 200	4 012 560	8 718 848	122 324 940	1 088 592		558 452 401
Vernon	1982				26 029	3 123 100			3 149 129
	1983				**2 760**	**3 497 916**			**3 500 676**
	To Date		351 416	141 367	432 438	34 964 899	161 254		36 051 374
Victoria	1982		780			8 174 560			8 175 340
	1983				**9 414**	**11 321 145**			**11 330 559**
	To Date	326 058 081	1 230 211	55	541 977	104 777 432	10 855 136		443 462 892
Not Assigned	1982				8 846	1 058 160			1 067 006
	1983								
	To Date		315 498	505 018	2 888 690	67 281 680	3 180 828	5 972 171	80 143 885
Totals	1982	69 265 713	10 465 577	24 547	12 898 647	65 648 899	5 853 261		164 156 644
	1983	**71 080 982**	**12 126 785**	**28 047**	**17 910 535**	**99 919 233**	**7 335 946**		**208 401 528**
	To Date	875 503 038	141 068 924	9 445 069	178 256 374	1 013 699 658	171 537 294	5 972 171	2 395 482 528

Table 3-8A—Production of Coal, 1836–1983

Year	Quantity[1]	Value	Year	Quantity[1]	Value
	t	$		t	$
1836–59	37 985	149 548	1921	2 422 455	12 836 013
1860	14 475	56 988	1922	2 473 692	12 880 060
1861	13 995	55 096	1923	2 391 998	12 678 548
1862	18 409	72 472	1924	1 839 619	9 911 935
1863	21 687	85 380	1925	2 305 337	12 168 905
1864	29 091	115 528	1926	2 182 760	11 650 180
1865	33 345	131 276	1927	2 316 408	12 269 135
1866	25 518	100 460	1928	2 431 794	12 633 510
1867	31 740	124 956	1929	2 154 607	11 256 260
1868	44 711	176 020	1930	1 809 364	9 435 650
1869	36 376	143 208	1931	1 601 600	7 684 155
1870	30 322	119 372	1932	1 464 759	6 523 644
1871	50 310	164 612	1933	1 249 347	5 375 171
1882	50 310	164 612	1934	1 297 306	5 725 133
1873	50 311	164 612	1935	1 159 721	5 048 864
1874	82 856	244 641	1936	1 226 780	5 722 502
1875	111 912	330 435	1937	1 312 003	6 139 920
1876	141 425	417 576	1938	1 259 626	5 565 069
1877	156 525	462 156	1939	1 416 184	6 280 956
1878	173 587	522 538	1940	1 507 758	7 088 265
1879	245 172	723 903	1941	1 673 516	7 660 000
1880	271 889	802 785	1942	1 810 731	8 237 172
1881	232 020	685 171	1943	1 682 591	7 742 030
1882	286 666	846 417	1944	1 752 626	8 217 966
1883	216 721	639 897	1945	1 381 654	6 454 360
1884	400 391	1 182 210	1946	1 305 516	6 732 470
1885	371 461	1 096 788	1947	1 538 895	8 680 440
1886	331 875	979 908	1948	1 455 552	9 765 395
1887	419 992	1 240 080	1949	1 470 782	10 549 924
1888	497 150	1 467 903	1950	1 427 907	10 119 303
1889	589 133	1 739 490	1951	1 427 513	10 169 617
1890	689 020	2 034 420	1952	1 272 150	9 729 739
1891	1 045 607	3 087 291	1953	1 255 662	9 528 279
1892	839 591	2 479 005	1954	1 186 849	9 154 544
1893	993 988	2 934 882	1955	1 209 157	8 986 501
1894	1 029 204	3 038 859	1956	1 285 664	9 346 518
1895	954 727	2 824 687	1957	984 886	7 340 339
1896	909 237	2 693 961	1958	722 490	5 937 860
1897	906 610	2 734 522	1959	625 964	5 472 064
1898	1 146 015	3 582 595	1960	715 455	5 242 223
1899	1 302 088	4 126 803	1961	833 827	6 802 134
1900	1 615 688	4 744 530	1962	748 731	6 133 986
1901	1 718 692	5 016 398	1963	771 594	6 237 997
1902	1 667 960	4 832 257	1964	826 737	6 327 678
1903	1 473 933	4 332 297	1965	862 513	6 713 590
1904	1 712 739	4 953 024	1966	771 848	6 196 219
1905	1 855 121	5 511 861	1967	824 436	6 045 341
1906	1 929 540	5 548 044	1968	870 180	7 588 989
1907	2 255 214	7 637 713	1969	773 226	6 817 155
1908	2 143 225	7 356 866	1970	2 398 635	19 559 669
1909	2 439 109	8 574 884	1971	4 141 496	45 801 936
1910	3 007 074	11 108 335	1972	5 466 846	66 030 210
1911	2 305 778	8 071 747	1973	6 924 733	87 976 105
1912	2 913 778	10 786 812	1974	7 757 440	154 593 643
1913	2 461 665	9 197 460	1975	8 924 816	317 111 744
1914	2 029 400	7 745 847	1976	7 537 695	298 683 679
1915	1 883 851	7 114 178	1977	8 424 181	328 846 883
1916	2 343 671	8 900 675	1978	9 463 920	381 895 241
1917	2 209 982	8 484 343	1979	10 570 370	439 280 152
1918	2 336 238	12 833 994	1980	10 823 530	461 492 857
1919	2 207 659	11 975 671	1981	11 752 621	554 271 292
1920	2 587 763	13 450 169	1982	10 645 742	566 878 240
			1983	11 480 298	555 789 196
			Totals	245 535 620	4 894 934 723

[1] Quantity from 1836 to 1909 is gross mine output and includes material lost in picking and washing. For 1910 and subsequent years the quantity is that sold and used.

Table 3-8B—Coal Production and Distribution

	Raw Coal Production			Clean Coal Production	Coal Used
	Surface	Under-ground	Total		Making Coke and Plant Use
	t	t	t	t	t
Fort Steele Mining Division					
Byron Creek Collieries Ltd.					
Thermal	1 557 240		1 557 240	1 292 148	
Crows Nest Resources					
Thermal	1 237 721		1 237 721	834 412	
Metallurgical	801 384		801 384	611 058	
Fording Coal Ltd.					
Metallurgical	4 157 278		4 157 278	2 695 886	
Thermal	60 255		60 255	60 255	
Westar Mining Ltd. (Balmer)					
Metallurgical	5 676 247	969 328	6 645 575	5 226 199	
Westar Mining Ltd. (Greenhills)					
Metallurgical	704 815		704 815	514 360	
Thermal	558 729		558 729	444 906	
Total Fort Steele	14 753 669	969 328	15 722 997	11 679 224	
Liard Mining Division					
Bullmoose Operating Corp.					
Metallurgical	265 699		265 699	206 291	
Quintette Coal Ltd.					
Metallurgical	611 678		611 678	42 001	
Thermal	826 205		826 205	39 650	
Total Liard	1 703 582		1 703 582	287 942	
Omineca Mining Division					
Bulkley Valley Coal Ltd.					
Thermal	80		80		6
Totals 1983					
Metallurgical	12 653 438	969 328	13 622 766	9 519 149	
Per cent of 1983 totals	77	100	78	80	
Thermal	3 803 893		3 803 893	2 448 017	6
Per cent of 1983 totals	23		22	20	100
Totals 1983	16 457 331	969 328	17 426 659	11 967 166	6

Table 3-8C—Raw and Clean Coal Produced

Year	Raw Coal Produced			Clean Coal Produced		
	Metallurgical	Thermal	Total	Metallurgical	Thermal	Total
	t	t	t	t	t	t
1973	9 806 384	77 287	9 883 671	6 992 044	58 866	7 050 910
1974	9 503 578	658 697	10 162 275	7 133 053	607 337	7 740 390
1975	12 160 856	777 937	12 938 793	8 872 438	766 733	9 579 802
1976	9 405 065	724 935	10 130 000	6 785 282	713 087	7 498 369
1977	10 564 568	993 022	11 557 590	7 793 920	786 729	8 580 649
1978	11 093 352	1 285 863	12 379 215	8 034 021	1 059 027	9 093 048
1979	13 412 935	1 214 796	14 627 731	9 676 908	906 742	10 583 650
1980	12 901 844	1 261 669	14 163 513	9 098 175	1 058 050	10 156 225
1981	14 547 742	941 878	15 489 620	10 897 614	844 912	11 742 526
1982	13 814 671	3 329 186	17 143 857	9 392 743	2 285 967	11 678 710
1983	13 622 766	3 803 893	17 426 659	9 519 149	2 448 017	11 967 166

by Collieries and by Mining Divisions, 1983

Coal Sales							Total Coal Sold and Used		
Canada			United States	Japan	Others	Total Sales	Quantity	Total Value	Average Value
British Columbia	Other Provinces	Total							
t	t	t	t	t	t	t	t	$	$/t
68 421	592 733	661 154	46 786	155 017	96 814	959 771	959 771	C	C
.....	.....	.....	.....	651 158	101 467	752 625	752 625	O	O
.....	5 587	5 587	49 329	89 751	487 725	632 392	632 392	N	N
.....	4 515	4 515	.....	2 174 072	705 949	2 884 536	2 884 536	F	F
.....	.....	.....	.....	.....	64 014	64 014	64 014	I	I
10 107	6 347	16 454	109	3 371 623	1 941 401	5 329 587	5 329 587	D	D
.....	.....	.....	3	162 298	188 002	350 303	350 303	E	E
.....	.....	.....	31 659	30 518	444 814	506 991	506 991	N	N
78 528	609 182	687 710	127 886	6 634 437	4 030 186	11 480 219	11 480 219	T	T
.....	.....	.....	.....	.....	.....	.....	.....	I	I
.....	.....	.....	.....	.....	.....	.....	.....	A	A
.....	.....	.....	.....	.....	.....	.....	.....	L	L
.....	.....	.....	.....	.....	.....	.....	.....		
73	.....	73	.....	.....	.....	73	79	3 380	42.78
10 107	10 862	20 969	112	6 359 151	2 936 819	9 317 051	9 317 051	491 949 790	52.80
13	2	3	.....	96	73	81	81	86	
68 494	598 320	666 814	127 774	275 286	1 093 367	2 163 241	2 163 247	63 839 406	29.51
87	98	97	100	4	27	19	19	14	
78 601	669 182	687 783	127 886	6 634 437	4 030 186	11 480 292	11 480 298	555 789 196	48.41

and Coal Sold and Used, 1973–1983

Coal Sold and Used								
Metallurgical			Thermal			Totals		
Quantity	Value	Average Price Per t	Quantity	Value	Average Price Per t	Quantity	Value	Average Price Per t all Types of Coal
t	$	$/t	t	$	$/t	t	$	$/t
6 853 120	87 406 677	12.75	71 613	569 428	7.21	6 924 733	87 976 105	12.70
7 261 404	149 025 665	20.52	496 036	5 567 978	11.22	7 757 440	154 593 643	19.93
8 104 102	305 484 901	37.70	820 714	11 626 843	14.17	8 924 816	317 111 744	35.53
6 824 493	283 753 979	41.58	713 202	14 929 700	20.93	7 537 695	298 683 679	39.63
7 615 953	314 316 005	41.27	808 228	14 639 667	18.11	8 424 181	328 846 883	39.04
8 530 370	361 254 854	42.35	933 550	20 640 387	22.11	9 463 920	381 895 241	40.35
9 591 975	412 392 598	42.99	978 395	26 887 554	27.48	10 570 370	439 280 152	41.56
9 654 317	423 128 068	43.83	1 169 213	38 364 789	32.81	10 823 530	461 492 857	42.64
10 811 498	518 427 584	47.95	914 123	35 843 708	38.09	11 752 621	554 271 292	47.16
8 399 674	487 004 686	57.98	2 246 068	79 873 554	35.56	10 645 742	566 878 240	53.25
9 317 051	491 949 790	52.80	2 163 247	63 839 406	29.51	11 480 298	555 789 196	48.41

Table 3-8D—Destination of British Columbia Coal—1983*

Destination	Bulkley Valley	Byron Creek	Crows Nest		Fording Coal		Westar (Balmer)	Westar (Greenhills)		Total Sales		Grand Totals
	Thermal	Thermal	Metallurgical	Thermal	Metallurgical	Thermal	Metallurgical	Metallurgical	Thermal	Metallurgical	Thermal	
	t	t	t	t	t	t	t	t	t	t	t	t
Canada—												
B.C.	73	68 421					16 341			16 341	68 494	84 835
Alberta		728									728	728
Manitoba		61 071		5 587	4 515		113			4 628	66 658	71 286
Ontario		530 934									530 934	530 934
Total Canadian	73	661 154		5 587	4 515		16 454			20 969	666 814	687 783
Foreign—												
Algeria					50 763					50 763		50 763
Brazil			24 751		76 406		259 904			361 061		361 061
Chile					38 853	30 442	94 201			133 054	30 442	163 496
Denmark				107 486					238 190		345 676	345 676
Hong Kong		61 989							127 357		189 346	189 346
Japan		155 017	651 158	89 751	2 174 072		3 371 623	162 298	30 518	6 359 151	275 286	6 634 437
Korea			76 716	353 159	262 442	33 572	1 097 009	149 524	43 996	1 585 691	430 727	2 016 418
Pakistan							142 657			142 657		142 657
Philippines		34 825							35 271		70 096	70 096
Sweden							99 673			99 673		99 673
Taiwan				27 080	277 485		247 957	38 478		563 920	27 080	591 000
U.S.A.		46 786		49 329			109	3	31 659	112	127 774	127 886
Total Foreign		298 617	752 625	626 805	2 880 021	64 014	5 313 133	350 303	506 991	9 296 082	1 496 427	10 792 509
Totals, all sales	73	959 771	752 625	632 392	2 884 536	64 014	5 329 587	350 303	506 991	9 317 051	2 163 241	11 480 292

* Excludes coal used at plants and for making coke.

Table 3-9—Principal Items of Expenditures for Operations of all Classes

Class	Salaries and Wages	Fuel and Electricity	Process Supplies
	$	$	$
Metal Mining	239 802 535	117 072 654	233 424 890
Exploration and Development	137 117 991	.....	.....
Coal	163 760 206	50 557 810	56 520 943
Petroleum and Natural Gas (Exploration and Development)	13 701 000	.....	.....
Industrial Minerals	17 923 948	8 721 755	9 400 482
Structural Materials	19 055 767	17 068 215	9 164 428
Totals			
1983	591 361 447	193 420 434	308 510 743
1982	738 103 508	195 477 056	364 539 992
1981	673 125 913	150 053 316	346 669 928
1980	449 970 343	110 011 602	267 065 783
1979	387 135 371	97 166 988	211 066 592
1978	335 136 110	84 785 125	189 133 090
1977	337 382 149	71 149 313	192 025 357
1976	277 736 828	59 220 204	170 075 616
1975	246 953 568	49 104 838	154 476 238
1974	272 945 078	42 381 258	140 002 685
1973	221 877 595	36 750 711	103 840 649
1972	199 351 449	31 115 621	77 092 955
1971	179 175 692	23 166 904	68 314 944
1970	172 958 282	19 116 672	59 846 370
1969	123 450 327	14 554 123	43 089 559
1968	113 459 219	13 818 326	38 760 203
1967	94 523 495	13 590 759	34 368 856
1966	93 409 528	12 283 477	28 120 179
1965	74 938 736	11 504 343	30 590 631
1964	63 624 559	10 205 861	27 629 953
1963	57 939 294	10 546 806	12 923 325
1962	55 522 171	9 505 559	14 024 799
1961	50 887 275	8 907 034	17 787 127
1960	52 694 818	7 834 728	21 496 912
1959	49 961 996	7 677 321	17 371 638
1958	48 933 560	8 080 989	15 053 036
1957	56 409 056	8 937 567	24 257 177
1956	57 266 026	9 762 777	22 036 839
1955	51 890 246	9 144 034	21 131 572
1954	48 702 746	7 128 669	19 654 724
1953	55 543 490	8 668 099	20 979 411
1952	62 256 631	8 557 845	27 024 500
1951	52 607 171	7 283 051	24 724 101
1950	42 738 035	6 775 998	17 500 663
1949	41 023 786	7 206 637	17 884 408
1948	38 813 506	6 139 470	11 532 121
1947	32 160 338	5 319 470	13 068 948
1946	26 190 200	5 427 458	8 367 705
1945	22 620 975	7 239 726	5 756 628
1944	23 131 874	5 788 671	6 138 084
1943	26 051 467	7 432 585	6 572 317
1942	26 913 160	7 066 109	6 863 398
1941	26 050 491	3 776 747	7 260 441
1940	23 391 330	3 474 721	6 962 162
1939	22 357 035	3 266 000	6 714 347
1938	22 765 711	3 396 106	6 544 500
1937	21 349 690	3 066 311	6 845 330
1936	17 887 619	2 724 144	4 434 501
1935	16 753 367	2 619 639	4 552 730

NOTE—This table has changed somewhat through the years, so that the items are not everywhere directly comparable. Prior to 1962, lode mining referred only to gold, silver, copper, lead, and zinc. Prior to 1964, some expenditures for fuel and electricity were included with process supplies. Process supplies (except fuel) were broadened in 1964 to include "process, operating maintenance and repair supplies . . . used in the mine/mill operations; that is explosives, chemicals, drill steel, bits, lubricants, electrical, etc. . . . not charged to Fixed Assets Account . . . provisions and supplies sold in any company-operated cafeteria or commissary." Exploration and development other than in the field of petroleum and natural gas is given, starting in 1966.

Table 3-10—Employment in the Mineral Industry, 1901–1983

Year	Metals						Coal Mines			Structural Materials		Industrial Minerals	Exploration and Development	Petroleum and Natural Gas Exploration and Development	Total
	Mines														
	Placer	Under	Above	Concentrates	Smelters	Total	Under	Above[1]	Total	Quarries and Pits	Plants				
1901	.....	2 736	1 212	.....	.....	3 948	3 041	933	3 974	.....	.....	.....	.....	.....	7 922
1902	.....	2 219	1 126	.....	.....	3 345	3 101	910	4 011	.....	.....	.....	.....	.....	7 356
1903	.....	1 662	1 088	.....	.....	2 750	3 137	1 127	4 264	.....	.....	.....	.....	.....	7 014
1904	.....	2 143	1 163	.....	.....	3 306	3 278	1 175	4 453	.....	.....	.....	.....	.....	7 759
1905	.....	2 470	1 240	.....	.....	3 710	3 127	1 280	4 407	.....	.....	.....	.....	.....	8 117
1906	.....	2 680	1 303	.....	.....	3 983	3 415	1 390	4 805	.....	.....	.....	.....	.....	8 788
1907	.....	2 704	1 239	.....	.....	3 943	2 862	907	3 769	.....	.....	.....	.....	.....	7 712
1908	.....	2 567	1 127	.....	.....	3 694	4 432	1 641	6 073	.....	.....	.....	.....	.....	9 767
1909	.....	2 184	1 070	.....	.....	3 254	4 713	1 705	6 418	.....	.....	.....	.....	.....	9 672
1910	.....	2 472	1 237	.....	.....	3 709	5 903	1 855	7 758	.....	.....	.....	.....	.....	11 467
1911	.....	2 435	1 159	.....	.....	3 594	5 212	1 661	6 873	.....	.....	.....	.....	.....	10 467
1912	.....	2 472	1 364	.....	.....	3 836	5 275	1 855	7 130	.....	.....	.....	.....	.....	10 966
1913	.....	2 773	1 505	.....	.....	4 278	4 950	1 721	6 671	.....	.....	.....	.....	.....	10 949
1914	.....	2 741	1 433	.....	.....	4 174	4 267	1 465	5 732	.....	.....	.....	.....	.....	9 906
1915	.....	2 709	1 435	.....	.....	4 144	3 708	1 283	4 991	.....	.....	.....	.....	.....	9 135
1916	.....	3 357	2 036	.....	.....	5 393	3 694	1 366	5 060	.....	.....	.....	.....	.....	10 453
1917	.....	3 290	2 198	.....	.....	5 488	3 760	1 410	5 170	.....	.....	.....	.....	.....	10 658
1918	.....	2 626	1 764	.....	.....	4 390	3 658	1 769	5 427	.....	.....	.....	.....	.....	9 817
1919	.....	2 513	1 746	.....	.....	4 259	4 145	1 821	5 966	.....	.....	.....	.....	.....	10 225
1920	.....	2 074	1 605	.....	.....	3 679	4 191	2 158	6 349	.....	.....	.....	.....	.....	10 028
1921	.....	1 355	975	.....	.....	2 330	4 722	2 163	6 885	.....	.....	.....	.....	.....	9 215
1922	.....	1 510	1 239	.....	.....	2 749	4 712	1 932	6 644	.....	.....	.....	.....	.....	9 393
1923	.....	2 102	1 516	.....	.....	3 618	4 342	1 807	6 149	.....	.....	.....	.....	.....	9 767
1924	.....	2 353	1 680	.....	.....	4 033	3 894	1 524	5 418	.....	.....	.....	.....	.....	9 451
1925	.....	2 298	2 840	.....	.....	5 138	3 828	1 615	5 443	.....	.....	.....	.....	.....	10 581
1926	299	2 606	1 735	808	2 461	7 610	3 757	1 565	5 322	493	324	124	.....	.....	14 172
1927	415	2 671	1 916	854	2 842	8 283	3 646	1 579	5 225	647	138	122	.....	.....	14 830
1928	355	2 707	2 469	911	2 748	8 835	3 814	1 520	5 334	412	368	120	.....	.....	15 424
1929	341	2 926	2 052	966	2 948	8 892	3 675	1 353	5 028	492	544	268	.....	.....	15 565
1930	425	2 316	1 260	832	3 197	7 605	3 389	1 256	4 645	843	344	170	.....	.....	14 032
1931	688	1 463	834	581	3 157	6 035	2 957	1 125	4 082	460	526	380	.....	.....	12 171
1932	874	1 355	900	542	2 036	4 833	2 628	980	3 608	536	329	344	.....	.....	10 524
1933	1 134	1 786	1 335	531	2 436	6 088	2 241	853	3 094	376	269	408	.....	.....	11 369
1934	1 122	2 796	1 729	631	2 890	8 046	2 050	843	2 893	377	187	360	.....	.....	12 985
1935	1 291	2 740	1 497	907	2 771	7 915	2 145	826	2 971	536	270	754	.....	.....	13 737
1936	1 124	2 959	1 840	720	2 678	8 197	2 015	799	2 814	931	288	825	.....	.....	14 179
1937	1 371	3 603	1 818	1 168	3 027	9 616	2 286	867	3 153	724	327	938	.....	.....	16 129
1938	1 303	3 849	2 266	919	3 158	10 192	2 088	874	2 962	900	295	369	.....	.....	16 021
1939	1 252	3 905	2 050	996	3 187	10 138	2 167	809	2 976	652	311	561	.....	.....	15 890
1940	1 004	3 923	2 104	1 048	2 944	10 019	2 175	699	2 874	827	334	647	.....	.....	15 705
1941	939	3 901	1 823	1 025	3 072	9 821	2 229	494	2 723	766	413	422	.....	.....	15 084
1942	489	2 920	1 504	960	3 555	8 939	1 892	468	2 360	842	378	262	.....	.....	13 270
1943	212	2 394	1 699	891	2 835	7 819	2 240	611	2 851	673	326	567	.....	.....	12 448
1944	255	1 896	1 825	849	2 981	7 551	2 150	689	2 839	690	351	628	.....	.....	12 314
1945	209	1 933	1 750	822	2 834	7 339	1 927	503	2 430	921	335	586	.....	.....	11 820
1946	347	1 918	1 817	672	2 813	7 220	1 773	532	2 305	827	555	679	.....	.....	11 933
1947	360	3 024	2 238	960	3 461	9 683	1 694	731	2 425	977	585	869	.....	.....	14 899
1948	348	3 143	2 429	1 126	3 884	10 582	1 594	872	2 466	1 591	656	754	.....	.....	16 397
1949	303	3 034	2 724	1 203	3 763	10 724	1 761	545	2 306	2 120	542	626	.....	.....	16 621
1950	327	3 399	2 415	1 259	3 759	10 832	1 745	516	2 261	1 916	616	660	.....	.....	16 612
1951	205	3 785	3 695	1 307	4 044	12 831	1 462	463	1 925	1 783	628	491	.....	.....	17 863
1952	230	4 171	3 923	1 516	4 120	13 730	1 280	401	1 681	1 530	557	529	.....	.....	18 257
1953	132	3 145	2 589	1 371	3 901	11 006	1 154	396	1 550	1 909	559	634	.....	.....	15 790
1954	199	2 644	2 520	1 129	3 119	9 412	1 076	358	1 434	1 861	638	584	.....	.....	14 128
1955	103	2 564	2 553	1 091	3 304	9 512	1 100	378	1 478	1 646	641	722	.....	.....	14 102
1956	105	2 637	2 827	1 043	3 339	9 846	968	398	1 366	1 598	770	854	.....	.....	14 539
1957	67	2 393	2 447	838	3 328	9 006	1 020	360	1 380	1 705	625	474	.....	.....	13 257
1958	75	1 919	1 809	625	3 081	7 434	826	260	1 086	1 483	677	446	.....	.....	11 201
1959	99	1 937	1 761	618	3 008	7 324	765	291	1 056	1 357	484	459	.....	.....	10 779
1960	86	1 782	1 959	648	3 034	7 423	894	288	1 182	1 704	557	589	.....	.....	11 541
1961	74	1 785	1 582	626	3 118	7 111	705	237	942	1 828	508	571	.....	.....	11 034
1962	35	1 677	1 976	949	3 356	7 958	548	228	776	1 523	481	517	270	.....	11 560
1963	43	1 713	2 012	850	3 239	7 814	501	247	748	909	460	528	450	.....	10 952
1964	5	1 839	1 967	822	3 281	7 909	446	267	713	1 293	444	509	772	.....	11 645
1965	2	1 752	2 019	965	3 529	8 265	405	244	649	1 079	422	639	786	441	12 283
1966	2	2 006	2 296	1 014	3 654	8 970	347	267	614	1 269	393	582	1 894	478	14 202
1967	.....	1 928	2 532	992	3 435	8 887	260	197	457	1 309	372	584	1 264	507	13 380
1968	.....	1 823	2 369	1 072	3 283	8 547	195	358	553	1 207	380	582	3 990	400	15 659
1969	7	1 794	2 470	1 099	3 468	8 831	245	455	700	1 097	549	567	4 270	416	16 437
1970	.....	2 160	3 167	1 331	3 738	10 396	242	1 033	1 275	740	647	627	4 964	437	19 086
1971	.....	2 073	3 058	1 513	3 481	10 125	444	1 013	1 457	846	794	666	4 040	495	18 423
1972	.....	1 833	3 463	1 734	3 353	10 383	214	1 771	1 985	1 116	800	527	4 201	458	19 470
1973	.....	1 704	4 005	2 394	3 390	11 493	265	1 951	2 216	898	802	667	3 392	454	19 922
1974	.....	1 509	4 239	2 352	2 767	10 867	267	2 255	2 522	895	782	646	2 848	509	19 069
1975	.....	1 100	3 619	1 983	3 733	10 435	299	2 464	2 763	826	725	705	2 931	518	18 903
1976	.....	1 268	3 733	2 048	3 542	10 591	327	2 300	2 627	931	680	670	3 101	495	19 095
1977	.....	1 208	3 768	2 224	3 590	10 790	312	2 556	2 868	1 380	626	766	3 537	490	20 457
1978	.....	1 009	3 874	2 029	3 838	10 750	377	2 606	2 983	734	460	618	3 232	496	19 273
1979	.....	898	3 615	2 084	4 273	10 870	413	2 931	3 344	931	601	726	3 707	489	20 668
1980	.....	1 012	4 173	2 463	4 800	12 448	354	3 258	3 612	473	940	728	5 800	362	24 363
1981	.....	1 280	5 292	2 986	4 843	14 401	343	3 277	3 620	131	562	678	7 201	298	26 891
1982	.....	1 318	4 722	2 366	4 177	12 583	347	4 305	4 652	131	442	554	6 651	437	25 450
1983	.....	**1 176**	**3 788**	**1 846**	**3 606**	**10 416**	**258**	**3 991**	**4 298**	**122**	**389**	**554**	**3 720**	**448**	**19 949**

[1] Commencing with 1967, does not include employment in by-product plants.

NOTE—These figures refer only to company employees and do not include the many employees of contracting firms.

Table 3-11—Employment at Major Metal and Coal Mines, 1983

	Tonnes		Days Operating Mill	Average Number Employed[1]					
	Mined	Milled		Administrative	Mine		Mill	Others	Total
					Surface	Underground			
Metal Mines									
Afton Mines Ltd. (Afton)	1 176 853	1 075 083	132	26	163	.....	27	.....	216
Brenda Mines Ltd. (Brenda)	8 557 000	8 185 403	273	109	128	.....	126	.....	363
Canada Wide Mines Ltd. (Granduc)	1 137 372	1 031 805	250	60	.....	229	149	.....	438
Carolin Mines Ltd. (Carolin)	346 949	346 949	301	13	.....	57	45	17	132
Cominco Ltd. (Sullivan)	1 523 266	2 017 383	285	203	111	418	206	.....	938
Cominco Ltd. (Valley Copper)	7 461 980	7 171 985	349	81	199	.....	120	11	411
Craigmont Mines Ltd. (Craigmont)	.....	.....	....	7	.....	.....	.....	.....	7
Dankoe Mines Ltd. (Horn Silver)	3 600	3 600	24	5	1	4	4	.....	14
David Minerals Ltd. (Utica)	.....	1 257	40	1	.....	.....	4	.....	5
Dickenson Mines Ltd. (Silvana)	29 636	28 234	298	5	7	24	14	.....	50
Dupont of Canada Exploration Ltd. (Baker)	22 286	29 021	323	10	.....	7	21	.....	48
Equity Silver Mines Ltd. (Equity Silver)	2 438 552	2 179 740	365	39	176	.....	117	.....	332
Erickson Gold Mining Corp. (Erickson)	69 497	69 497	354	10	7	52	13	45	127
Falconbridge Nickel Mines Ltd. (Tasu)	906 563	906 563	267	26	.....	23	51	.....	100
Gibraltar Mines Ltd. (Gibraltar)	7 754 400	13 517 000	361	95	48	.....	207	.....	350
Grove Exploration Ltd. (French)	3 394	3 394	28	2	.....	2	1	.....	5
Highmont Mining Corp. (Highmont)	10 486 070	8 796 983	364	52	242	.....	82	172	447
Lornex Mining Corp. Ltd. (Lornex)	28 [illegible] 257	28 766 769	365	103	496	.....	224	100	923
Maclaren Forest Products Inc. (Goldstream)	293 631	293 631	245	36	.....	36	30	25	127
Maclaren Forest Products Inc. (Boss Mountain)	29 772	29 772	22	4	2	5	4	.....	15
Mosquito Creek Gold Mining Co. (Mosquito Creek)	18 947	18 947	343	5	.....	25	25	.....	55
Newmont Mines Ltd. (Similkameen)	7 103 166	6 850 166	365	72	119	.....	107	.....	298
Placer Development Ltd. (Endako)	.....	.....	....	31	.....	.....	25	.....	56
Scottie Gold Mines Ltd. (Scottie)	59 930	60 861	361	7	21	36	26	.....	90
Taurus Resources Ltd. (Taurus)	42 256	42 256	365	3	19	17	.....	.....	39
Teck Corp. Ltd. (Highland Bell)	36 203	36 203	355	8	6	19	10	.....	43
Utah Mines Ltd. (Island Copper)	16 318 132	16 330 081	359	134	503	.....	182	.....	819
Wesmin Resources Ltd. (Lynx and Myra)	248 376	248 376	313	67	57	222	26	.....	372
Total Metal Mines	.....	.....	....	1 214	2 204	1 176	1 846	370	6 810
Coal Mines	Raw Coal								
Bullmoose Operating Corp.	265 699	.....	92	44	101	.....	.....	.....	145
Byron Creek Collieries Ltd.	1 557 240	.....	351	66	77	.....	19	58	220
Crows Nest Resources Ltd.	2 039 105	.....	365	94	268	.....	56	188	606
Fording Coal Ltd.	5 207 533	.....	325	180	712	.....	66	372	1 330
Quintette Coal Ltd.[2]	81 651	.....	31	15	34	.....	.....	.....	49
Westar Mining Ltd. (Balmer)	6 645 575	.....	319	451	684	258	144	.....	1 537
Westar Mining Ltd. (Greenhills)	1 263 544	.....	365	160	208	.....	43	.....	411
Total Coal Mines	.....	.....	....	1 010	2 084	258	328	618	4 298

[1] The average number of employed includes wage-earners and salaried employees. The average is obtained by adding the monthly figures and dividing by 12, irrespective of the number of months worked.

[2] Estimated.

Table 3-12—Metal Production, 1983

Property of Mine (and Location of Mine)	Owner or Agent	Ore Shipped or Treated	Product Shipped	Gross Metal Content					
				Gold	Silver	Copper	Lead	Zinc	Cadmium
		t		g	g	kg	kg	kg	kg
Alberni Mining Division									
Lynx and Myra (Buttle Lake)	Westmin Resources Ltd.	248 376	Copper concentrates, 11 969 t; lead concentrates, 5 316 t; zinc concentrates, 30 654 t	578 431	27 086 089	2 580 863	2 542 008	17 204 718	67 278
Atlin Mining Division									
Nil									
Cariboo Mining Division									
Boss Mountain (Tokomkane Mountain)	Maclaren Forest Products (Boss Mountain Division)	29 770	Molybdenite concentrates, 93 t containing 51 539 kg of molybdenum						
Gibraltar (McLeese Lake)	Gibraltar Mines Ltd.	13 517 000	Copper concentrates, 107 698 t; molybdic oxide, 1 213 t, containing 662 602 kg of molybdenum		4 098 101	28 018 884			
Mosquito Creek (Wells)	Mosquito Creek Gold Mining Co. Ltd.	18 947	Gold bullion	205 591	63 762				
Clinton Mining Division									
Nil									
Fort Steele Mining Division									
Sullivan (Kimberley)	Cominco Ltd.	2 017 383	Lead concentrates, 169 657 t; zinc concentrates, 125 264 t; tin concentrates, 421 t containing 136 377 kg of tin		127 609 074		111 437 071	69 505 850	
Golden Mining Division									
Nil									
Greenwood Mining Division									
Boundary Falls, Skomac (Greenwood)	Robert Mines Ltd.	1 633	Lead concentrates, 68 t	1 173	159	864	11 918	5 193	
Highland Bell (Beaverdell)	Teck Corporation	36 203	Lead concentrates, 291 t; zinc concentrates, 172 t; jig concentrates, 513 t	4 106	9 962 164		89 760	104 317	154
Kamloops Mining Division									
Afton (Kamloops)	Afton Mines Ltd.	1 075 853	Blister copper, 3 869 t; copper concentrates, 7 524 t	472 275	3 384 014	7 312 220			
Highmont (Highland Valley)	Highmont Mining Corp.	8 796 983	Copper concentrates, 43 891 t; molybdenite concentrates, 2 872 t containing 1 550 333 kg of molybdenum			15 993 486			
Lornex (Highland Valley)	Lornex Mining Corp. Ltd.	28 766 769	Copper concentrates, 322 736 t; molybdenite concentrates, 5 313 t; containing 2 768 393 kg of molybdenum		24 992 888	87 442 989			
Valley (Highland Valley)	Cominco Ltd. (Copper Division)	7 171 985	Copper concentrates, 67 651 t	92 936	11 747 100	29 965 965			
Liard Mining Division									
Erickson (McDame Lake)	Erickson Gold Mines Ltd.	69 497	Gold concentrates, 1 815 t	1 149 706					
Taurus (Cassiar)	Taurus Resources Ltd.	42 256	Gold concentrates, 1 060 t	174 646					
Lillooet Mining Division									
Pioneer (Bralorne)	L. Haig-Smillie, Vancouver	18	Crude ore	1 462	379				
Nanaimo Mining Division									
Island Copper (Rupert Inlet)	Utah Mines Ltd.	16 330 081	Copper concentrates, 260 497 t; molybdenite concentrates, 3 696 t containing 1 672 777 kg of molybdenum; rhenium shipments are confidential	1 618 220	14 931 722	60 032 220			
Trek (Copper Canyon)	Trek Resources Ltd.	31	Crude ore	393	1 283		81	94	

Nelson Mining Division									
Motherlode (Salmo)	Nugget Mines Ltd.	99	Lead concentrates, 99 t	2 644	2 457		358	718	
Referendum (Fortynine Creek)	Tom Cherry, Nelson	61	Crude ore	19	348				
New Westminster Mining Division									
Carolin (Hope)	Carolin Mines Ltd.	346 949	Gold bullion; slag, 12 t	597 443	62 746				
Nicola Mining Division									
Craigmont (Merritt)	Craigmont Mines Ltd.	*	Iron concentrates, 23 906 t						
Omineca Mining Division									
Baker, Chapelle (Black Lake)	DuPont of Canada Exploration Ltd.	29 021	Gold bullion	361 111	6 966 370				
Endako (Endako)	Placer Development Ltd. (Endako Division)	*	Molybdenite concentrates, 135 t; molybdic oxide, 1 700 t; ferro-molybdenum, 182 t; containing 1 223 038 kg of molybdenum						
Equity Silver (Houston)	Equity Silver Mines Ltd.	2 179 740	Copper-silver-gold concentrates, 37 175 t	835 816	152 684 000	7 346 833			
Henderson (Hazelton)	Paul Kindrat, Smithers	386	Crude ore	1 489	867 134		32 303	27 284	
Silver Standard (Hazelton)	George Braun, Hazelton	133	Crude ore	323	215 485		7 302	7 336	
Osoyoos Mining Division									
Brenda (Brenda Lake)	Brenda Mines Ltd.	8 185 403	Copper concentrates, 34 061 t; molybdenite concentrates, 4 037 t containing 2 250 143 kg of molybdenum	99 798	5 883 743	9 831 329			
French (Nickel Plate Mountain)	Grove Exploration Ltd.	3 394	Copper concentrates, 19 t; lead concentrates, 140 t	23 606	116 668	17 635			
Horn Silver (Keremeos)	Dankoe Mines Ltd.	3 600	Lead concentrates, 54 t	3 296	282 451	1 755			
Revelstoke Mining Division									
Goldstream (Revelstoke)	Maclaren Forest Products Ltd. Goldstream Mining Division	293 631	Copper concentrates, 38 659 t; zinc concentrates, 419 t		2 644 604	8 202 987		186 786	
Similkameen Mining Division									
Similkameen, Ingerbelle (Princeton)	Newmont Mines Ltd. (Similkameen Division)	6 850 166	Copper concentrates, 72 284 t	613 018	5 687 955	21 577 679			
Skeena Mining Division									
Black Hill No. 2 (Stewart)	John Lehto, Stewart	9	Crude ore		81 864		1 833	1 548	
Gold Cliff (Stewart)	Bayview Resources Ltd.	10	Crude ore		71 227		1 769	1 671	
Granduc (Stewart)	Canada Wide Mines Ltd.	1 031 805	Copper concentrates, 42 123 t	133 273	7 950 859	11 925 042			
Scottie, Summit Lake (Stewart)	Scottie Gold Mines Ltd.	60 861	Gold bullion	980 742	531 928				
Tasu (Tasu Sound)	Falconbridge Nickel Mines Ltd. (Wesfrob Mines Division)	906 563	Iron concentrates, 442 406 t; copper concentrates, 17 214 t	79 768	3 363 880	3 782 281			
Slocan Mining Division									
Goodenough (Sandon)	Modern Metal Recovery	9	Lead concentrates, 9 t		28 086		768	1,936	
Hall (Sandon)	Hallmac Mines Ltd.	905	Crude ore		1 704 128		248 013		
Hecla (Silverton)	Mengler Leasing Co.	710	Lead concentrates, 34 t; zinc concentrates, 43 t	27	39 937		622	22 590	
Hewitt (Silverton)	Frank Pho, New Denver	3 166	Lead concentrates, 98 t; zinc concentrates, 205 t	43	26 405		2 565	104,481	
Jumbo (Silverton)	Totem Industries Ltd.	12	Crude ore		12 068		744	1 534	
Nor 1 and 2 (Lendrum Creek)	K. Hawes, Faro, Yukon	5	Crude ore		8 274			214	
Ogema (Slocan)	Arley Mines Ltd.	52	Crude ore		62 960		965	14,496	
Ottawa (Springer Creek)	H. Sanders	5	Lead concentrates, 5 t		9 393		162	61	

Table 3-12—Metal Production, 1983—Continued

Property of Mine (and Location of Mine)	Owner or Agent	Ore Shipped or Treated	Product Shipped	Gross Metal Content					
				Gold	Silver	Copper	Lead	Zinc	Cadmium
		t		g	g	kg	kg	kg	kg
Republic No. 2 (Slocan)	Don Ray, Slocan	44	Crude ore	75	6 376		86	46	
Silmonac, Silvana, Minniehaha (Slocan Lake)	Dickenson Mines Ltd.	28 234	Lead concentrates, 1 398 t; zinc concentrates, 1 159 t		8 187 524		778 115	758 587	4 966
Silver Bell (Slocan)	J. Nesbitt, Silverton	12	Crude ore		25 723		6 274	943	
Utica (12 Mile Creek)	David Minerals Ltd.	1 257	Lead concentrates, 66 t	157	174 584		6 021	15 155	
Trail Creek Mining Division									
IXL (Rossland)	James Penney, Rossland	10	Crude ore	63	527				
Midnight (Rossland)	Carnelian Mines Ltd.	41	Crude ore	2 756	33 744		327	40	
Vancouver Mining Division									
Nil									
Vernon Mining Division									
Waterloo (Kelowna)	Cous Creek Copper Mines Ltd.	11	Crude ore		25 132	5	54	120	
Victoria Mining Division									
Nil									

* No milling in 1983.

Table 3-13A—Destination of British Columbia Ore and Concentrates, 1983

Destination	Ore	Gold/ Silver/Copper Concentrates	Copper Concentrates	Lead Concentrates	Zinc Concentrates	Iron Concentrates	Molybdenite Concentrates, Molybdic Trioxides, Ferro-Molybdenum	Tin Concentrates
CANADA	t	t	t	t	t	t	t	t
Trail	1 437	513	.....	142 740	153 895	.....	.....	.....
Other Canadian	.....	1 131	72 720	.....	.....	77 397	544	.....
FOREIGN								
Australia	.....	.....	.....	.....	.....	66 875	17	.....
Chile	.....	4 245	.....	.....	.....	.....	761	.....
France	.....	.....	.....	.....	.....	.....	24	.....
Germany	.....	2	43 891	.....	.....	.....	2 900	.....
Italy	.....	.....	.....	.....	.....	.....	1	.....
Japan	.....	22 383	665 529	14 549	4 021	348 790	2 087	.....
Korea	.....	.....	53 822	.....	.....	.....	.....	.....
Taiwan	.....	.....	63 987	.....	.....	.....	.....	.....
U.K.	.....	.....	3 869	.....	.....	.....	35	421
U.S.A.	303	2 813	97 188	5 316	.....	3 761	1 638	.....
U.S.S.R.	.....	.....	.....	14 630	.....	.....	.....	.....
Europe (country not specified)	.....	9 476	.....	.....	.....	.....	7 215	.....
Other (not specified)	.....	.....	29 189	.....	.....	.....	4 019	.....
Totals	1 740	40 563	1 030 195	177 235	157 916	496,823	19 241	421

Table 3-13B—Destination of Metals in Ores and Concentrates Shipped from British Columbia Mines—1983
(Showing Metals Paid for and Values)

Country	Gold		Silver		Copper		Lead	
	g	$	g	$	kg	$	kg	$
Canadian Shipments	2 537 088	42 172 931	151 691 242	66 990 224	17 463 315	34 650 260	93 488 403	39 320 418
Foreign Shipments								
Australia								
Chile	65 908	1 725 077	19 011 627	9 861 760	811 834	1 594 015		
France								
Germany	529 791	8 459 534		108 735*	15 484 870	32 522 306		−4 167*
Italy								
Japan	2 979 390	49 135 201	155 498 036	69 164 779	179 900 968	354 495 781	8 659 494	4 245 735
Korea	41 586	642 308	4 855 017	2 120 476	15 909 314	31 102 843		
Mexico*	−14 867	18 825	−715 131	374 724	−21 610	39 439		
Taiwan	378 278	6 689 793	3 632 401	1 820 187	14 546 690	31 727 018		
U.K.	247 242	2 744 473	1 600 000	394 707	3 817 118	6 202 531		
U.S.A.	742 130	11 472 603	13 555 248	6 926 295	25 503 703	49 507 151	1 964 404	369 571
U.S.S.R.			9 288 058	4 433 214			8 829 683	4 846 879
Europe (not specified)	187 025	3 494 369	41 819 028	17 198 868	1 693 796	3 686 368		
Misc. (not specified)			2 089 812	978 160	7 754 699	15 584 021		
Total Foreign	5 156 483	84 382 183	250 634 096	113 381 905	265 401 382	526 461 473	19 453 581	9 458 018
Total Shipments	7 693 571	126 555 114	402 325 338	180 372 129	282 864 697	561 111 733	112 941 984	48 778 436

* Prior year adjustment

Table 3-13B—Destination of Metals in Ores and Concentrates Shipped from British Columbia Mines—1983
(Showing Metals Paid for and Values)

Country	Zinc		Cadmium		Iron		Molybdenum		Tin	
	kg	$	kg	$	t	$	kg	$	kg	$
Canadian Shipments	93 745 411	78 025 157	136 486	418 251	77 397	2 454 995	338 470	3 923 491		
Foreign Shipments										
Australia					66 875	2 425 858	9 552	98 185		
Chile							355 090	2 337 293		
France							13 228	143 989		
Germany							1 303 094	7 376 063		
Italy							804	7 200		
Japan	1 541 407	1 609 057	1 685	5 592	348 790	8 024 599	1 206 863	12 549 902		
Korea										
Mexico										
Taiwan										
U.K.							14 593	113 312	136 347	1 985 213
U.S.A.					3 761	173 013	847 906	7 782 446		
U.S.S.R.										
Europe (not specified)							3 979 483	32 116 791		
Misc. (not specified)							2 109 742	21 136 151		
Total Foreign	1 541 407	1 609 057	1 685	5 592	419 426	10 623 470	9 840 355	83 661 332	136 347	1 985 213
Total Shipments	95 286 818	79 634 214	138 171	423 843	496 823	13 078 465	10 178 825	87 584 823	136 347	1 985 213

Table 3-14—Petroleum and Natural Gas, 1954–1983

Year	Crude Oil		Field Condensate		Plant Condensate		Natural Gas to Pipeline		Butane		Propane		Total Value
	m^3	$	m^3	$	m^3	$	$10^3 m^3$	$	m^3	$	m^3	$	
1954	.....	.....	.....	.....	.....	.....	1 715	6 545	.....	.....	.....	.....	6 545
1955	93	480	.....	.....	.....	.....	4 752	18 130	.....	.....	.....	.....	18 610
1956	23 602	299 322	.....	.....	.....	.....	5 292	20 143	.....	.....	.....	.....	319 465
1957	54 901	763 751	.....	.....	4 449	no value	233 13[illegible]	433 830	.....	.....	.....	.....	1 197 581
1958	81 675	1 009 609	.....	.....	39 915	380 072	1 635 204	3 368 327	12 980	26 115	10 985	22 110	4 806 233
1959	137 484	1 573 227	.....	.....	81 554	367 797	1 817 945	3 928 839	32 916	66 249	15 410	31 016	5 967 128
1960	137 981	1 531 049	.....	.....	119 377	459 741	2 257 170	7 101 949	46 643	93 878	19 888	40 029	9 226 646
1961	161 462	1 900 104	25	297	129 349	737 761	2 703 776	8 818 891	51 148	102 946	25 928	52 185	11 612 184
1962	1 415 772	16 827 118	1 530	18 184	133 206	674 644	3 062 513	10 226 323	61 618	124 019	34 500	69 438	27 939 726
1963	1 989 747	24 900 381	2 174	27 205	133 828	536 193	2 973 071	10 719 298	65 041	130 908	32 619	65 651	36 379 636
1964	1 832 404	23 396 716	4 192	63 436	146 622	587 685	3 351 574	12 192 816	73 415	147 763	38 921	78 337	36 466 753
1965	2 141 679	28 696 841	5 053	67 696	150 632	576 106	3 910 948	14 493 255	75 996	152 956	57 042	114 808	44 101 662
1966	2 645 259	36 268 683	6 291	86 265	154 946	312 360	4 543 460	17 339 587	79 650	160 311	53 153	106 981	54 274 187
1967	3 125 181	44 748 477	6 450	92 357	161 541	267 941	5 596 092	21 667 136	93 505	188 197	65 672	132 178	67 096 286
1968	3 521 783	50 082 837	8 611	122 408	152 670	247 455	6 317 544	24 531 445	83 870	168 814	63 723	128 256	75 281 215
1969	4 023 815	58 176 213	12 425	180 520	150 104	263 278	7 218 831	27 897 585	66 385	133 613	52 069	104 800	86 756 009
1970	4 032 130	60 405 941	17 052	277 829	159 489	253 009	7 678 940	29 804 411	49 074	98 772	66 828	134 505	90 974 467
1971	3 999 185	66 471 856	17 331	287 781	177 137	293 287	7 685 055	31 946 372	50 590	101 822	74 547	150 040	99 251 158
1972	3 788 849	63 166 717	16 619	277 069	161 854	327 820	9 939 498	41 616 824	54 200	106 533	76 323	150 015	105 644 978
1973	3 368 902	68 306 032	20 114	407 807	180 088	222 463	10 789 269	54 762 105	109 057	212 640	99 188	193 398	124 104 445
1974	3 012 501	103 335 328	16 561	568 075	178 534	924 549	9 016 996	128 018 726	105 426	232 085	89 373	196 742	233 275 505
1975	2 269 898	94 229 725	16 094	668 092	185 272	6 525 837	9 236 489	214 733 528	106 427	2 577 205	81 975	1 985 087	320 719 474
1976	2 367 450	116 595 050	18 309	901 711	167 576	7 198 957	8 799 508	287 997 059	109 781	4 591 832	88 195	3 688 955	420 973 564
1977	2 200 303	132 859 085	24 465	1 477 248	180 267	9 751 058	8 895 663	396 601 354	111 357	5 358 167	91 297	4 392 944	550 439 856
1978	2 004 699	145 005 524	25 386	1 836 217	155 503	10 269 861	8 003 029	401 373 236	106 580	5 932 766	85 732	4 513 447	568 931 051
1979	2 139 963	168 928 671	32 549	2 569 418	184 398	13 396 500	11 392 641	699 508 127	112 683	7 122 711	84 864	4 851 698	896 377 125
1980	2 002 128	189 561 479	36 855	3 489 431	133 601	11 641 991	8 931 833	612 545 107	89 556	6 491 914	75 507	4 572 704	828 302 626
1981	2 035 953	236 170 548	27 871	3 233 036	124 946	13 284 259	8 062 681	616 795 096	84 635	9 953 076	64 118	5 080 069	884 516 084
1982	2 078 258	333 892 930	20 771	3 337 069	135 185	19 765 399	7 188 561	542 664 470	89 443	9 436 236	68 783	3 806 451	912 882 555
1983	2 078 771	402 075 887	17 636	3 411 155	113 984	20 225 321	6 899 911	455 187 128	80 291	12 897 946	62 494	5 553 842	899 351 279
Totals	58 671 828	2 471 179 581	354 364	23 400 306	3 796 027	119 491 344	168 153 699	4 676 317 642	2 002 267	66 609 474	1 579 134	40 215 686	7 397 214 033